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DIPTERA BRACHYCERA.

VOL. I.

BY

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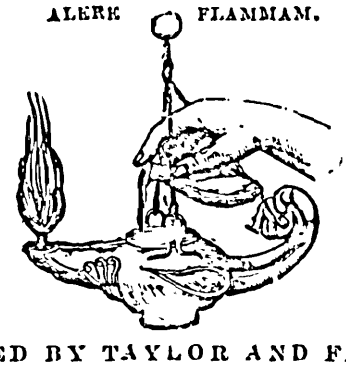

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PREFACE.

OWING to the war, the difficulties of communication, and the loss of ships coming from the East, there has been an unusual delay in the issue of the present volume, and it has unfortunately been found impossible to incorporate in it certain corrections which the author wished to make. Further, owing to the difficulties under which publishers and printers now labour, it was felt by the Editor necessary to publish without further delay.

Another difficulty which has arisen in the preparation of the volume is due to the fact that the MS. ran to a far larger volume than the Indian Government contemplates, and it was therefore reluctantly decided to publish the following families: Stratiomyidæ, Leptidæ, Nemestrinidæ, Cyrtidæ, Bombyliidæ, Therevidæ, Scenopinidæ, Mydaidæ, Empidæ, Lonchopteridæ, and Platypezidæ; leaving the remainder, *i. e.*, the families Pipunculidæ, Syrphidæ, Conopidæ, and Oestridæ for a second volume. This proceeding is, I gather, against the wishes of the author, but no other solution of the difficulty appeared possible.

A. E. SHIPLEY.

1st May, 1920.

SYSTEMATIC INDEX.

Page

Order DIPTERA 1

Suborder BRACHYCERA .. 1

Fam. 1. STRATIOMYIDÆ 17

Subfam. 1. *Pachygastrinæ* 19

1. Pachygaster, *Mg.* 20
   1. annulipes, *Brun.* 21
2. Zabrachia, *Coq.* 21
   1. albipes, *Brun.* 21
   2. annulifemur, *Brun.* 22
3. Monacanthomyia, *Brun.* .. 23
   1. annandalei, *Brun.* 24
4. Acraspidea, *Brauer* 24
   1. felderi, *Brauer* 24
5. Wallacea, *Dol* 24
   1. argentea, *Dol.* 25
6. Acanthina, *Wied.* 26
   1. azurea, *Gerst.* 26
   2. argentihirta, *Brun.* 28
7. Craspedometopon, *Kert.* .. 28
   1. frontale, *Kert.* 29
8. Tinda, *Walk.* 29
   1. javana, *Macq.* 30
9. Evaza, *Walk.* 31
   1. flavipes, *Big.* 32
   2. bipars, *Walk.* 32
   3. indica, *Kert.* 33
10. Ptilocera, *Wied.* 33
    1. fastuosa, *Gerst.* 34
11. Stratiosphecomyia, *Brun.* . 36
    1. variegata, *Brun.* 37

Subfam. 2. *Clitellariinæ* 38

1. Hermetia, *Latr.* 39
   1. læta, *Meij.* 40
2. Eudmeta, *Wied.* 41
   1. marginata, *Fabr.* 42
   2. brunnea, *Meij.* 43
   3. flavida, *Brun.* 43
3. Ampsalis, *Walk.* 44
   1. longispinus, *Brun.* 44
4. Ephippium, *Latr.* 45
   1. bilineatum, *Fabr.* 46
5. Negritomyia, *Big.* 47
   1. maculipennis, *Macq.* .. 47
6. Ruba, *Walk.* 48
   1. inflata, *Walk.* 49
7. Clitellaria, *Mg.* 49
   1. heminopla, *Wied.* 50
   2. bistriata, *Brun.* 52
8. Lasiopa, *Brullé* 52
   1. villosa, *Fabr.*, var. himalayensis, *Brun.* 53
9. Oxycera, *Mg.* 53
   1. signata, *Brun.* 54
   2. albomicans, *Brun.* 55

Subfam. 3. *Stratiomyinæ* 56

1. Cyphomyia, *Wied.* 57
   1. indica, *Brun.* 57
2. Stratiomyia, *Geoff.* 58
   1. barca, *Walk.* 59
   2. micropilosa, *Brun.* 60
   3. fulvescens, *Brun.* 60
3. Odontomyia, *Mg.* 61
   1. cyanea, *Brun.* 63
   2. rufoabdominalis, *Brun.* . 64
   3. pulcherrima, *Brun.* 65
   4. minuta, *Fabr.* 65
   5. rubrithorax, *Macq.* 67
   6. kashmirensis, *Brun.* .. 67
   7. dorsoangulata, *Brun.* .. 68

Odontomyia (*con.*). Page
8. solennis, *Walk.* 69
9. lutatius, *Walk.* 70
10. transversa, *Brun.* 71
11. viridana, *Wied.* 72

Subfam. 4. *Sarginæ* 72

1. Ptecticus, *Lw.* 73
1. longipennis, *Wied.* 75
2. cyaneus, *Brun.* 75
3. aurobrunneus, *Brun.* .. 76
4. wulpii, *Brun.* 77
5. apicalis, *Lw.* 77
6. aurifer, *Walk.* 78
7. australis, *Sch.* 79
8. cingulatus, *Lw.*, var. ceylonicus, *Brun.* 80
2. Sargus, *Fabr.* 81
1. gemmifer, *Walk.* 81
2. metallinus, *Fabr.* 82
3. mactans, *Walk.* 83
3. Chloromyia, *Dunc.* 84
1. sapphirina, *Walk.* 84
4. Brachycara, *Thoms.* 85
1. ventralis, *Thoms.* 85
5. Prosopochrysa, *Meij.* 86
1. vitripennis, *Dol.* 86
6. Microchrysa, *Lw.* 87
1. flaviventris, *Wied.* 88
2. calopa, *Brun.* 88

Subfam. 5. *Berinæ* 89

1. Beris, *Latr.* 90
1. geniculata, *Curt.* 91
2. annulipes, *Brun.* 92
2. Chlorisops, *Rond.* 92
1. tibialis, *Mg.* 93
3. Allognosta, *O.-S.* 93
1. vagans, *Lw.* 94
2. assamensis, *Brun.* 95

Subfam. 6. *Xylomyinæ* 96

1. Xylomyia, *Rond.* 96
1. flavipes, *Dol.* 98
2. calopodata, *Big.* 98
3. nigricornis, *Brun.* 99

Fam. 2. LEPTIDÆ 100

Subfam. 1. *Xylophaginæ* 104

1. Rhachicerus, *Walk.* 104
1. bicolor, *Brun.* 105
2. nigricornis, *Brun.* 105
3. unicinctus, *Brun.* 106

Subfam. 2. *Arthroceratinæ* .. 107

1. Desmomyia, *Brun.* 107
1. thereviformis, *Brun.* .. 107
2. Pararthropeas, *Brun.* 108
1. thereviformis, *Brun.* .. 109

Subfam. 3. *Coenomyinæ* 110

1. Coenomyiodes, *Brun.* 110
1. edwardsi, *Brun.* 111

Subfam. 4. *Leptinæ* 112

1. Atrichops, *Verr.* 112
1. calopa, *Brun.* 114
2. lanopyga, *Brun.* 115
3. limbata, *O.-S.* 115
4. intermedia, *Brun.* 116
5. metatarsalis, *Brun.* 117
6. cincta, *Brun.* 118
7. cærulescens, *Brun.* 119
2. Atherix, *Mg.* 120
1. labiata, *Big.* 120
3. Suragina, *Walk.* 121
1. elegans, *Karsch* 121
4. Macellopalpus, *Big.* 122
1. fulvidus, *Brun.* 122
2. fascipennis, *Brun.* 123
5. Leptis, *Fabr.* 124
1. apicipennis, *Brun.* 125
2. discoidalis, *Brun.* 126
3. unicolor, *Brun.* 126
4. triangulata, *Brun.* 127
6. Chrysopilus, *Macq.* 128
1. marmoratus, *Brun.* 131
2. albopictus, *Brun.* 131
3. ornatipennis, *Brun.* 132
4. luctuosus, *Brun.* 133
5. flavopunctatus, *Brun.* .. 133
6. opalescens, *Brun.* 134
7. humeralis, *Brun.* 135
8. segmentatus, *Brun.* 135
9. cochinensis, *Brun.* 136
10. birmanensis, *Brun.* 137
11. gravelyi, *Brun.* 137
12. similis, *Brun.* 138
13. magnipennis, *Brun.* 138
14. flavopilosus, *Brun.* 138
15. yerburyi, *Brun.* 139
16. albobasalis, *Brun.* 140
17. insularis, *Sch.* 140
18. ferruginosus, *Wied.* .. 141

Chrysopilus (*con.*). Page
19. unicolor, *Brun.* 141
20. stigma, *Brun.* 142
21. latus, *Brun.* 143
22. sordidus, *Brun.* 143
23. alternatus, *Brun.* 144

Fam. 3. NEMESTRINIDÆ 144

1. Hirmoneura, *Mg.* 147
1. annandalei, *Licht.* 149
2. basalis, *Licht.* 149
3. opaca, *Licht.* 150
4. cingulata, *Licht.* 151
5. brunnea, *Licht.* 151
6. ochracea, *Licht.* 151
7. austeni, *Licht.* 152
8. coffeata, *Licht.* 152
2. Trichopsidea, *Westw.* 153
1. dohrni, *Wand.* 153
3. Atriadops, *Wand.* 154
1. javana, *Wied.* 155
4. Ceylonia, *Licht.* 155
1. magnifica, *Licht.* 156

Fam. 4. CYRTIDÆ 157

Subfam. 1. *Philopotinæ* 158

1. Philopota, *Wied.* 158
1. viridænea, *Brun.* 159

Subfam. 2. *Panopinæ* 160

1. Pialea, *Erichs.* 160
1. auripila, *Brun.* 161

Subfam. 3. *Cyrtinæ* 163

1. Lasia, *Wied* 163
1. aurata, *Brun.* 164
2. Pterodontia, *Gray* 165
1. kashmirensis, *Licht.* .. 166
2. dorsolineata, *Brun.* 167
3. Oncodes, *Latr.* 168
1. costalis, *Walk.* 169
2. octomaculatus, *Brun.* .. 170
3. fuscus, *Brun.* 171
4. angustimarginatus, *Brun.* 171
5. rufomarginatus, *Brun.* . 171

Fam. 5. BOMBYLIIDÆ 173

Subfam. 1. *Anthracinæ* 176

1. Hyperalonia, *Rond.* 178
1. dives, *Walk.* 180
2. tristis, *Wulp* 180

Page
3. tantalus, *Fabr.* 181
4. chrysolampis, *Jaen.* 182
5. flaviventris, *Dol.* 183
6. œnomaus, *Rond.* 185
7. aurantiaca, *Guér.* 186
8. sphinx, *Fabr.* 187
9. suffusipennis, *Brun.* .. 188
10. semifuscata, *Brun.* 188
2. Exoprosopa, *Macq.* 189
1. flavipennis, *Brun.* 192
2. flammea, *Brun.* 193
3. lar, *Fabr.* 194
4. pennipes, *Wied.* 197
5. latipennis, *Brun.* 198
6. lateralis, *Brun.* 198
7. annandalei, *Brun.* 199
8. maculiventris, *Brun.* .. 200
9. stylata, *Brun.* 201
10. insulata, *Walk.* 203
11. puerula, *Brun.* 205
12. bengalensis, *Macq.* 206
13. brahma, *Sch.* 206
14. niveiventris, *Brun.* 207
15. vitripennis, *Brun.* 209
16. vitrea, *Big.* 210
17. basifascia, *Walk.* 211
18. alexon, *Walk.* 211
19. semilucida, *Walk.* 212
20. auriplena, *Walk.* 212
21. albida, *Walk.* 212
3. Spogostylum, *Macq.* 213
1. austeni, *Brun.* 213
4. Argyramœba, *Sch.* 214
1. bipunctata, *Fabr.* 217
2. distigma, *Wied.* 218
3. obscurifrons, *Brun.* 220
4. limitaris, *Brun.* 220
5. intermedia, *Brun.* 221
6. bipoti, *Brun.* 222
7. gestroi, *Brun.* 222
8. niveicauda, *Brun.* 224
9. duvaucelii, *Macq.* 225
10. argentiapicalis, *Brun.* .. 227
11. instituta, *Walk.* 227
12. claripennis, *Brun.* 228
13. niveisquamis, *Brun.* .. 229
14. nigrofemorata, *Brun.* .. 230
15. gentilis, *Brun.* 230
5. Lepidanthrax, *O.-S.* 232
1. compacta, *Brun.* 233
2. transversa, *Brun.* 233
6. Anthrax, *Scop.* 234
1. fletcheri, *Brun.* 236
2. guttatipennis, *Brun.* .. 237
3. himalayanus, *Brun.* .. 238

Page
Anthrax (*con.*).
4. afra, *Fabr.* 240
5. semifuscata, *Brun.* 241
6. manifesta, *Walk.* 242
7. clara, *Walk.* 243
8. approximata, *Brun.* .. 244
9. aperta, *Walk.* 245
10. fuscolimbata, *Brun.* .. 246
11. hottentotta, *var.* clari-pennis, *Brun.* 247
12. paniscus, *Rossi* 248
13. dia, *Wied.* 250
14. baluchianus, *Brun.* 250
15. albofulva, *Walk.* 251
16. aureohirta, *Brun.* 252
17. clausa, *Brun.* 253
18. troglodyta, *Fabr.* 254
19. lucida, *Walk.* 254
20. limpida, *Walk.* 255
21. referens, *Walk.* 255

Subfam. 2. *Lomatiinæ* 255

1. Aphœbantus, *Lw.* 256
1. ceylonicus, *Brun.* 257

Subfam. 3. *Bombyliinæ* 259

1. Empidideicus, *Beck* 260
1. indicus, *Brun.* 260
2. Bombylius, *Linn.* 261
1. orientalis, *Macq.* 263
2. wulpii, *Linn.* 264
3. major, *Linn.* 265
4. erectus, *Brun.* 267
5. maculatus, *Fabr.* 267
6. comastes, *Brun.* 268
7. albosparsus, *Big.* 270
8. vicinus, *Brun.* 270
9. terminalis, *Brun.* 270
10. fulvipes, *Big.* 271
11. propinquus, *Brun.* 272
3. Dischistus, *Lw.* 273
1. resplendens, *Brun.* 273
2. ardens, *Walk.* 274
4. Systœchus, *Lw.* 275
1. socius, *Walk.* 276
2. nivalis, *Brun.* 277
3. flavospinosus, *Brun.* .. 277
4. eupogonatus, *Big.* 278
5. Anastœchus, *O.-S.* 278
1. longirostris, *Wulp.* 278
6. Geron, *Mg.* 279
1. argentifrons, *Brun.* 279
2. albescens, *Brun.* 280
7. Usia, *Latr.* 281
1. sedophila, *Brun.* 282
2. marginata, *Brun.* 283

Page
8. Phthiria, *Mg.* 284
1. gracilis, *Walk.* 285

Subfam. 4. *Toxophorinæ* 286

1. Toxophora, *Mg.* 287
1. javana, *Wied.* 287

Subfam. 5. *Systropinæ* 289

1. Systropus, *Wied.* 289
1. ophioneus, *Westw.* 291
2. edwardsi, *Brun.* 294
3. eumenoides, *Westw.* .. 294
4. flavipleura, *Brun.* 295

Fam. 6. THEREVIDÆ 295

1. Thereva, *Latr.* 297
1. kempi, *Brun.* 298
2. nigella, *Wied.* 299
3. flavolineata, *Brun.* 299
4. bilineata, *Brun.* 300
5. cylindrica, *Walk.* 301
6. indica, *Walk.* 301
7. persequa, *Walk.* 301
8. invaria, *Walk.* 302
2. Psilocephala, *Zett.* 302
1. albina, *Wied.* 303
2. indica, *Big.* 304
3. ceylonica, *Kröb.* 304
4. sequa, *Walk.* 305
5. affinis, *Kröb.* 306
3. Phycus, *Walk.* 306
1. brunneus, *Wied.* 307
2. argentiventris, *Brun.* .. 309
3. atripes, *Brun.* 309

Fam. 7. SCENOPINIDÆ 310

1. Scenopinus, *Latr.* 311
1. fenestralis, *L.* 312

Fam. 8. MYDAIDÆ 314

1. Mydas, *Fabr.* 316
1. ruficornis, *Wied.* 317
2. carmichaeli, *Brun.* 318
3. annulata, *Brun.* 319
2. Leptomydas, *Gerst.* 320
1. indianus, *Brun.* 320

Fam. 9. EMPIDÆ 321

Subfam. 1. *Hybotinæ* 325

1. Syneches, *Walk.* 327
1. immaculatus, *Brun.* .. 328
2. bigoti, *Bezzi* 329

Syneches (*con.*). Page
3. inæqualis, *Brun.* 330
4. minutus, *Brun.* 330
5. rusticus, *Brun.* 331
6. palliditarsis, *Brun.* 331
7. fratellus, *Brun.* 332
8. insignis, *Brun.* 332
9. fuscipennis, *Brun.* 333
2. Syndyas, *Lw.* 333
1. parvicellulata, *Bezzi* .. 333
3. Harpamerus, *Big.* 334
1. signatus, *Big.* 334
4. Acarterus, *Lw.* 334
1. pallipes, *Bezzi* 335
2. fuscipennis, *Brun.* 335
5. Hybos, *Mg.* 336
1. bisetosus, *Bezzi* 338
2. tenuipes, *Brun.* 338
3. gagatinus, *Big.* 339
4. apicis, *Brun.* 340
5. geniculatus, *Wulp* 340
6. niger, *Brun.* 340
7. auripes, *Brun.* 341
8. nitens, *Brun.* 341
9. flavipalpis, *Brun.* 342
10. nigronitidus, *Brun.* 342
11. brunnipes, *Brun.* 343
6. Parahybos, *Kert.* 343
1. flavipes, *Brun.* 343

Subfam. 2. *Empinæ.* 344

1. Rhamphomyia, *Mg.* 345
1. unifasciata, *Brun.* 345
2. himalayana, *Brun.* 346
3. griseonigra, *Brun.* 346
2. Empis, *Linn.* 347
1. amplitarsis, *Brun.* 349
2. albohalteralis, *Brun.* .. 350
3. carbonaria, *Brun.* 351
4. squamata, *Brun.* 352
5. ceylonica, *Bezzi* 352
6. griseonigra, *Brun.* 353
7. centralis, *Brun.* 353
8. subcilipes, *Brun.* 354
9. rostrata, *Brun.* 355
10. marginata, *Brun.* 356
11. elegans, *Brun.* 356
12. inconspicua, *Brun.* 357
3. Hilara, *Mg.* 357
1. compacta, *Brun.* 358
2. bares, *Walk.* 359
3. rufithorax, *Brun.* 359
4. peshawarensis, *Brun.* .. 360
4. Howlettia, *Brun.* 363
1. flavipes, *Brun.* 361

Page
Subfam. 3. *Ocydromiinæ* 362

1. Leptopeza, *Macq.* 362
1. vitripennis, *Brun.* 363

Subfam. 4. *Hemerodromiinæ* .. 363

1. Clinocera, *Mg.* 364
1. fluviatilis, *Brun.* 365
2. obscura, *Brun.* 366
2. Microdromia, *Big.* 366
1. dorsalis, *Brun.* 367
3. Phyllodromia, *Zett.* 367
1. flavida, *Brun.* 368
2. indicata, *Brun.* 369
4. Dolichocephala, *Macq.* 370
1. septemnotata, *Brun.* .. 371
5. Trichopeza, *Rond.* 371
1. fusca, *Brun.* 372

Subfam. 5. *Tachydromiinæ* .. 373

1. Tachydromia, *Mg.* 374
1. latifascipennis, *Brun.* .. 375
2. ferruginea, *Brun.* 376
3. nepalensis, *Brun.* 377
4. gentilis, *Brun.* 377
5. orientalis, *Brun.* 378
2. Tachypeza, *Mg.* 378
1. palliditibiæ, *Brun.* 379
2. incisa, *Brun.* 379
3. Drapetis, *Mg.* 380
1. variegata, *Brun.* 381
2. discoidalis, *Bezzi* 382
3. brevior, *Brun.* 382
4. fascifemorata, *Brun.* .. 383
5. rotundicornis, *Brun.* .. 383
6. rufipes, *Brun.* 383
4. Elaphropeza, *Macq.* 384
1. basalis, *Bezzi* 384
2. bicoloripes, *Brun.* 385
3. fulvithorax, *Wulp* 385
4. ferruginea, *Brun.* 386
5. metatarsata, *Bezzi* 386
6. variegata, *Brun.* 387

Fam. 10. LONCHOPTERIDÆ .. 387

1. Lonchoptera, *Mg.* 388
1. lutea, *Panz.* 389

Fam. 11. PLATYPEZIDÆ. 390

1. Platypeza, *Mg.* 391
1. argyrogyna, *Meij.* 392

ORDER DIPTERA.

SUBORDER BRACHYCERA.

INTRODUCTION.

IN the first volume devoted to the Diptera in the "Fauna of British India" Series, the two great suborders, ORTHORRHAPHA and CYCLORRHAPHA, into which the order is now generally divided, were sufficiently characterised, and a comparison was also given between the NEMATOCERA and BRACHYCERA, into which the first suborder is subdivided. The earliest writers divided the Diptera into NEMOCERA and BRACHYCERA, of subordinal rank based mainly on palpal and antennal characters, and not on those of the venation or early stages, this classification finding favour until towards the close of the last century. Nowadays the old series of brachycerous families is split at or near the LONCHOPTERIDÆ, all those from the STRATIOMYIDÆ to that family being included in the ORTHORRHAPHA BRACHYCERA; the remainder, consisting of the PLATYPEZIDÆ, PIPUNCULIDÆ, SYRPHIDÆ, CONOPIDÆ and ŒSTRIDÆ, the enormous family MUSCIDÆ (*sensu latissimo*), and the pupiparous Diptera (the last-named forming in themselves a separate group of uncertain rank) constituting the CYCLORRHAPHA. One anomalous family, the PHORIDÆ, is by some placed next the LONCHOPTERIDÆ in the ORTHORRHAPHA BRACHYCERA, and by others next to the MUSCIDÆ in the CYCLORRHAPHA.

The formation of groups of higher rank than families has received the attention of many dipterologists of note, and Verrall gives an excellent *résumé* of Brauer's (1883) and Osten-Sacken's (1896) views. Verrall himself admitted that there were several points in Brauer's tables that were not clear to him and others with which he could not agree, and it may here be observed that Brauer's primary divisions or suborders of ORTHORRHAPHA and CYCLORRHAPHA have been criticised as lately as 1907 by Prof. Miall. Verrall, in noting this in a footnote, adds, "I quite agree with this distinguished savant in considering the two divisions, ORTHORRHAPHA and CYCLORRHAPHA, at present incomprehensible" (Dec. 1908). I find myself in the same predicament, and, personally, biological affinities notwithstanding, I have an instinctive leaning towards regarding all the families from the STRATIOMYIDÆ to the MUSCIDÆ, and the PHORIDÆ, as more closely related one to the other than are a certain number of them related

to the NEMATOCERA; in other words, I hesitate to abandon the "old-fashioned" classification of NEMATOCERA and BRACHYCERA, *pur et simple*, with the PUPIPARA as a third group, either of equal rank with the other two or as a subordinate section of the BRACHYCERA.

The NEMATOCERA and BRACHYCERA are certainly natural divisions, and Osten-Sacken believed that the characters distinguishing them were of more fundamental importance than those separating the ORTHORRHAPHA and CYCLORRHAPHA; he regarded them as of equal ordinal rank with the CYCLORRHAPHA. Williston, on the other hand, considers there is "no distinct limitation between the NEMOCERA and BRACHYCERA,"* but, according to Verrall, the shape of the anal cell provides an infallible character in all those cases in which doubt could possibly arise. It is quite evident, however, that these two groups have always been perfectly clear to most dipterologists from the fact that no dispute has ever arisen as to the group to which any particular family belonged; whilst, on the other hand, authors are by no means in agreement as to where the ORTHORRHAPHA NEMATOCERA end and the BRACHYCERA, in the restricted sense, begin. However, these questions of biological affinities amongst the higher divisions can only be approached by those possessing an intimate knowledge of all the families, and it would be out of place to attempt any discussion of the subject in a work restricted to the consideration of a limited number of families.

For the purposes of the present work it will be sufficient to give, in abbreviated and slightly modified form, Brauer's divisions of his CYCLORRHAPHA:—

1. Head not flattened, more or less hemispherical, placed perpendicularly to longitudinal axis of body; mouth placed below. Eyes always present. Dorsal and ventral segments of abdomen well developed, the connecting membrane concealed. Imagines living free, non-parasitic	2.
Head flattened, placed in longitudinal axis of body; mouth similarly placed, projecting forward. Eyes present or absent. Dorsal and ventral plates of abdomen very small or absent, owing to preponderance of connecting membrane. Imagines parasitic	PUPIPARA.
2. Frontal bladder-seam running round only upper side of base of antennæ, narrowly surrounding the lunule, the bladder-seam being therefore restricted, the bladder existing or rudimentary. Jowls not separated from the superincumbent cheeks. Anal cell long and pointed	3.

* Manual N. Amer. Dipt. 3rd ed. p. 59.

Frontal bladder-seam semicircular, forming above the lunule a distinctly margined upright arch, usually running steeply downwards over middle of face, usually separated and distinctly separating the cheeks and jowls at the sides. Anal cell generally short and often subequal in length with 2nd basal cell ..... EUMYIDÆ.

3. First posterior cell always closed. Vena spuria present ..... SYRPHIDÆ.

First posterior cell always open. Vena spuria absent ..... 4.

4. Arista terminal ..... PLATYPEZIDÆ.

Arista dorsal ..... PIPUNCULIDÆ.

The two latter families were left in the same divisional group by Brauer, but are easily separated by the character given above. It must be confessed that the table of groups is difficult to put to practical use, especially by a beginner. The EUMYIDÆ, unfortunately given a family termination, is a combination of the CONOPIDÆ, ŒSTRIDÆ, and MUSCIDÆ, all of which are regarded in the present volume as good and separate families.

The PUPIPARA, it is understood, consist of three distinct families, HIPPOBOSCIDÆ, NYCTERIBIIDÆ, and STREBLIDÆ.

The superfamilies herein admitted are those recognised by Verrall in his second published volume on British Diptera, and the following table of them is wholly drawn from that work :—

Table of Superfamilies.

1. Three equally well-developed pad-like pulvilli. Species absolutely eremochætous (*i. e.*, strong bristles on head and thorax entirely absent) .... EREMOCHÆTA.

Two pad-like pulvilli only, the empodium being sometimes absent or sometimes represented by a bristly hair. Species not truly eremochætous .. 2.

2. Basal cells long, the anal cell being open or long and pointed, because the branches of the 5th vein only gradually diverge, and the upper branch is usually connected with the discal cell by the posterior cross-vein, though sometimes (BOMBYLIIDÆ, SCENOPINIDÆ, etc.) it forms a part of the lower margin of the discal cell; wing-venation usually elaborate. Cephalic bristles on frons and vertex not strongly developed, though sometimes visible in ASILIDÆ. Often large or very large species and seldom small, and when small usually with long pubescence among the stronger bristles ..... 3.

Anal cell short except in a few EMPIDÆ (HYBOTINÆ) and shorter than the preceding basal cell (when that is present), and the upper basal cell rather long in the EMPIDÆ only; 5th vein with its lower branch recurrent (except in the HYBOTINÆ) and its upper branch quickly lost

in the 4th vein; 3rd vein simple except in a few EMPIDÆ; posterior cross-vein quite absent; posterior cells apparently never more than four, but usually less; wing-veins altogether few and simple; alula obsolete. Face bare or only slightly pubescent in the MICROPHONA, but with peristomal bristles in LONCHOPTERIDÆ and side or genal bristles in PHORIDÆ, but with no face beard or pubescence as in ASILIDÆ. Cephalic bristles usually strongly developed. Species always small and distinctly chætophorous ..... 5.

3. Aerial species, almost always clothed with dense furry pubescence. Legs thin and only suitable for alighting, and consequently armed with little more than spicules (not true bristles) on the femora and tibiæ. Eyes nearly always touching in the ♂ (holoptic) and never bulged out because of a sunken vertex..... TROMOPTERA.

Pedestrian species, usually armed with strong bristles and only occasionally (*Laphria*, *Isopogon*, etc.) clothed with dense coarse pubescence; or (DERMATINA) bare of both pubescence and bristles. Legs strong, usually armed with strong bristles on at least the tibiæ and tarsi. Eyes almost always widely separated in both sexes (dichoptic), and frequently bulging out because of the deeply sunken vertex ..... 4.

4. Eremochætous species in the sense that there are no strong bristles on any part of the thorax or scutellum ..... DERMATINA.

Chætophorous species in the sense that there are strong and usually numerous bristles on the thorax, scutellum, and legs, or at least on the sides of the metanotum, except in the few cases in which dense coarse pubescence is substituted. ENERGOPODA.

5. Wing-veins (including cross-veins) fairly normal, or else the 2nd and 3rd veins extended almost to the wing-tip. Antennæ with three (or rarely two) joints obvious, besides any style or arista.. 6.

Wing-veins extremely abnormal and quite distinct from those of any other Diptera (except *Aspistes* in the BIBIONIDÆ); anterior veins up to the 3rd vein strong and conspicuous, running into the basal half of the costa, but the subsequent veins very faint and incomplete and abnormally directed; 4th, 5th, and anal veins very difficult to trace. Palpi porrect, not jointed. Eyes widely and equally separated in both sexes. Antennæ apparently composed of one large joint, which bears a very long apical or dorsal arista. Hind legs long and the femora flattened ..... HYPOCERA.

Wing rounded at the tip; venation fairly normal, with the 2nd vein ending considerably before the wing-tip, and with at least one apparent cross-vein well out towards the middle of the wing, causing the discal cell to be present even if

extended back to the wing-base. Face, mouth-margin, and jowls without strong bristles. Thorax rarely with a soft pubescence. Eyes of the ♂ sometimes touching or approximated. Imagines always predaceous ..... MICROPHONA.

Wings pointed at the tip; venation abnormal, as the 2nd and 3rd veins end close together almost at the wing-tip; no obvious cross-vein, and the discal cell absent or reduced to a short middle basal cell. Face with strong bristles round the mouth-margin. Thorax with bristles but no pubescence. Eyes widely and equally separated in both sexes. Antennæ short and porrect, with a long subdorsal arista. Colour always dull yellowish, brownish, or greyish, but never green or metallic ..... ACROPTERA.

Verrall incorporates in the above table the sixteen families of BRACHYCERA which occur in Britain, as well as the seven superfamilies, which accounts for characters of minor value often being added, but it has seemed better to give his actual diagnoses of the higher groups in full than to attempt to abbreviate them. One or two terms in the venation and so on are changed for the purpose of preserving uniformity with my previous volume. His table (pp. 14 to 30) is illustrated with typical figures and is a veritable epitome of the salient characters of the BRACHYCERA.

Coming to families, there has been less difference of opinion amongst authors than as regards the higher groups, probably because the characters are drawn solely from the perfect insects. The exact rank of the CŒNOMYIDÆ and XYLOPHAGIDÆ as families has been questioned, and the affinities of the LONCHOPTERIDÆ and PHORIDÆ have given rise to considerable discussion. Notes on these points will be found under the respective family headings. I follow Osten-Sacken and Verrall in placing the XYLOMYINÆ subfamily of XYLOPHAGIDÆ in the STRATIOMYIDÆ, and the remaining subfamily, the XYLOPHAGINÆ, in the LEPTIDÆ, to which family also the CŒNOMYIDÆ are referred as a subfamily.

Some authors have desired to remove the MYOPINÆ subfamily from the CONOPIDÆ to the MUSCIDÆ and also to disband the ŒSTRIDÆ altogether and spread the genera amongst the MUSCIDÆ, but with these views I cannot concur.

Of two other families the taxonomic rank has been occasionally disputed, the ACANTHOMERIDÆ and APIOCERIDÆ, but as neither group occurs in the Orient they need not be discussed here. The former family contains the most gigantic flies known, so far as bulk goes, measuring up to 40 millimetres in length and 80 millimetres in expanse of the wings, and they are confined to the Neotropical Region. They are allied to the STRATIOMYIDÆ, LEPTIDÆ, and TABANIDÆ. The APIOCERIDÆ are akin to both the MYDAIDÆ and ASILIDÆ. Both these groups are now admitted to be of family rank.

Table of all Families of Diptera except the NEMATOCERA.

1. Body not of leathery texture. Head free; mouth generally well developed, with a more or less prominent proboscis. Two palpi and at least two oral bristles present. Femora approximate at base. Abdomen distinctly segmented. Oviparous or larviparous; in perfect state never parasitic on warm-blooded creatures ..... 2.

   Body of leathery texture. Head placed in a curved excavation of the thorax or bent back upon the thorax. Mouth very imperfect; palpi absent. Abdomen indistinctly segmented. Femora at base remote, through the broad mesothorax; claws well developed. Parasitic during pupal and imaginal stages in warm-blooded creatures (mammals and birds)..... 23.

2. Three distinct pulvilli. Absolutely eremochætous species (*i. e.*, no strong bristles on head or thorax as compared with pubescence) ..... 3.

   Two pulvilli (sometimes obsolete or absent).* Species not truly eremochætous, and often with dense furry pubescence, or bristly .. 8.

3. Third antennal joint annulated. Eyes in ♂ normally contiguous or very approximate (except in most NEMESTRINIDÆ); in ♀ wide apart ..... 4.

   Third antennal joint not annulated (except XYLOPHAGINÆ). Eyes in ♂ generally contiguous ..... 7.

4. Posterior cells not parallel with hind margin of wing †. "Diagonal" vein never present. Eyes in ♂ normally contiguous ..... 5.

   Posterior cells parallel with hind margin of wing. "Diagonal" vein generally present; wings often reticulate. Eyes in ♂ generally separated ..... **Nemestrinidæ,** [p. 144.

5. Tibiæ with at least middle pair spurred (indistinctly in ACANTHOMERIDÆ). Veins not crowded together in anterior part of wing. Ambient vein present (thin in ACANTHOMERIDÆ). Scutellum unspined. 6.

   Tibiæ without spurs (except in XYLOMYINÆ and some BERINÆ). Veins crowded together anteriorly (except XYLOMYINÆ and BERINÆ). Ambient vein absent or

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* Middle one sometimes shorter in NEMESTRINIDÆ, but always pad-like.

† Some CYRTIDÆ form exceptions, but the enormous thoracic squamæ, globular bodies, and general appearance of this family at once distinguish them.

incomplete. Scutellum often with two or four (rarely six or eight) spines on margin. **Stratiomyidæ,** [p. 17.

6. Antennæ flagelliform. Fourth posterior cell closed. Wing with marginal space of last submarginal cell at most twice that of immediately adjoining cells. Squamæ almost obsolete. Perfect insects never blood-suckers ..... **Acanthomeridæ.**

Antennæ normally sickle-shaped, rarely flagelliform or otherwise formed. Fourth posterior cell nearly always open. Wing with marginal space of last submarginal cell at least three or four times that of immediately adjoining cells. Squamæ very large. Adult females always blood-suckers ..... **Tabanidæ.**

7. Posterior tibiæ always spurred. Body generally elongate, abdomen never balloon-like. Eyes in ♂ contiguous, in ♀ wide apart; head of normal size and shape. Thoracic squamæ normal. Venation as in TABANIDÆ, except that the anal cell is sometimes open ..... **Leptidæ, p. 100.**

All tibiæ unspurred or with very short blunt ones. Body short, rounded; abdomen often balloon-like. Eyes in both sexes contiguous; head very small, inconspicuous, depressed, nearly all eyes. Thoracic squamæ enormous. Venation eccentric and complex ..... **Cyrtidæ, p. 157.**

8. Basal cells long, at least one-third the length of the wing. Anal cell (sometimes called the third basal) open, or long and pointed. 9.

Basal cells short (except in HYBOTINÆ). Anal cell shorter than preceding cell, when that is present. Third vein never forked, except in some EMPIDÆ ..... 18.

9. Posterior cells parallel with hind margin of wing. Second longitudinal vein (and sometimes upper branch of third also) ending in first longitudinal near its tip. Antennæ generally clavate at tip. Eyes in ♂ distinctly separated ..... **Mydaidæ, p. 314.**

Posterior cells not parallel with hind margin of wing. Second longitudinal vein ending in first only in APIOCERIDÆ and some ASILIDÆ; in all other families ending in wing-margin. Antennæ not clavate at tip. Eyes in ♂ contiguous or well separated ..... 10.

10. Upper branch of 4th vein ending before wing-tip ..... 11.

Upper branch of 4th vein ending below wing-tip 12

11. Venation more complex. Five posterior cells, the 4th closed. Eyes in ♂ always wide

apart, but less so than in ♀. First longitudinal vein receiving others in it before its tip. Thorax and scutellum with strong bristles and pubescence ..... **Apioceridæ.**

Venation simple and reduced. Three posterior cells. Eyes in ♂ contiguous or very approximate. First longitudinal vein never receiving others in it. Species quite destitute of bristles or pubescence. ..... **Scenopinidæ,** [p. 310.

12. Five posterior cells. Chætophorous species, generally very pubescent also ..... 13.

Three or four posterior cells. Eremochætous species, except BOMBYLIIDÆ and some SYRPHIDÆ ..... 14.

13. Vertex of head deeply sunken between the eyes, leaving the latter very prominent. Eyes in ♂ always separated ..... **Asilidæ.**

Vertex not sunken, therefore eyes not prominent. Eyes in ♂ contiguous or closely approximate..... **Therevidæ,** p. 295.

14. Third longitudinal vein generally forked. Posterior cross-vein absent. Eyes in ♂ normally contiguous in typical groups, but distinctly separated in ANTHRACINÆ; contiguous in both sexes in *Systropus*. Often densely furry species ..... **Bombyliidæ,** p. 173.

Third longitudinal vein never forked. Posterior cross-vein present. Eyes in ♂ contiguous or approximate, except rarely; but in CONOPIDÆ wide apart in both sexes. Normally not densely furry species, except in some SYRPHIDÆ..... 15.

15. Proboscis rigid and geniculate. First posterior cell closed; antennæ with apical style (CONOPINÆ), or first posterior cell open; antennæ with dorsal arista (MYOPINÆ) ..... **Conopidæ.**

Proboscis soft. First posterior cell closed or open. Antennæ of very various formation. 16.

16. First posterior cell closed. Vena spuria present (sometimes very faint). Eyes in both sexes of normal size and nature..... **Syrphidæ.**

First posterior cell open. Vena spuria absent. Eyes in both sexes very large (especially in PIPUNCULIDÆ); some of the facets often enormously enlarged..... 17.

17. Arista dorsal, 3rd longitudinal vein well curved;* apical section of 4th vein curved downwards; hind tarsi never dilated .... **Pipunculidæ.**

Arista apical, 3rd vein nearly straight; apical section of 4th vein curved inwards. Hind tarsi dilated ..... **Platypezidæ,** [p. 390.

18. Venation abnormal;† no obvious cross-vein

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* Nearly straight in *Chalarus*.

† Except in *Opetia*, a non-Oriental genus.

well out on disc of wing. Eyes in both sexes wide apart ..... 19.

Venation fairly normal (reduced in DOLICHOPODIDÆ); at least one obvious cross-vein well out on disc of wing. Eyes in ♂ contiguous, approximate, or wide apart..... 20.

19. Second and third longitudinal veins long, nearly parallel. Wings long, tips pointed; venation different in the sexes; no wingless species ..... **Lonchopteridæ,** [p. 387.

Second and third veins united in one rather short strong vein. Wings short, tips well rounded; venation similar in both sexes; some species wingless..... **Phoridæ.**

20. Discal cell united to 2nd basal cell; basal cells very short or obsolete. Third longitudinal vein diverging from a swelling near base of wing; anterior cross-vein at same spot; third vein never forked. Proboscis soft. Arista or style dorsal or apical. Abdomen normally 5- or 6-segmented.... **Dolichopodidæ.**

Discal and second basal cells separate (except in a few EMPIDÆ). Basal cells generally long enough to be obvious. Second and third veins diverging well away from base of wing; third vein not forked, except in some EMPIDÆ. Proboscis rigid or soft .. 21.

21. Antennal style present or absent; arista, if present, generally dorsal. Proboscis generally rigid, pointed. Abdomen normally 7-segmented. Second and third longitudinal veins diverging at one-third of the wing; third vein often forked ..... **Empidæ,** p. 321.

Antennal style never present; arista, when present, nearly always dorsal. Third vein never forked..... 22.

22. Proboscis rudimentary; palpi rudimentary or absent. In larval stage always parasitic on mammalia ..... **Œstridæ.**

Proboscis and palpi always distinctly present. In larval stage rarely parasitic on mammalia ..... **Muscidæ** (*s. latiss.*).

23. Head folding back on dorsum of thorax. Wingless species. Parasitic on bats .... **Nycteribiidæ.**

Head not folding back on thorax. Winged or wingless species. Parasitic on birds and mammals ..... 24.

24. Antennæ reduced. Wings with distinct parallel veins; cross-veins often present. Claws simple. Nearly all the species parasitic on bats ..... **Streblidæ.**

Antennæ generally more elongate. Wings, when present, with veins crowded together anteriorly; cross-veins short and near base of wing. Claws large. Parasitic on mammals and birds..... **Hippoboscidæ.**

The external characters of the BRACHYCERA and CYCLORRHAPHA exhibit as much, it not greater variation than those of the NEMATOCERA. As the introduction to the previous volume on Diptera dealt with characters common to the order generally, those pages may be consulted in conjunction with the present summary, which is confined to the BRACHYCERA and those families of the CYCLORRHAPHA treated of herein.

The eyes in the higher BRACHYCERA and higher CYCLORRHAPHA are generally contiguous or subcontiguous above in the male, and such flies are said to be holoptic, the eyes in the female being distinctly separated by a comparatively broad frons, but exceptions are numerous. Diptera in which the eyes are well separated in the ♂ are called dichoptic. The CYRTIDÆ have contiguous eyes in both sexes (with rare exceptions), and in some cases the eyes are contiguous both above and below; the MYDAIDÆ, ASILIDÆ, DOLICHOPODIDÆ, LONCHOPTERIDÆ, and CONOPIDÆ have the eyes equally conspicuously separated in both sexes. The lower ANTHOMYINÆ and practically all the ACALYPTRATA are also dichoptic. The eyes may be pubescent or bare, this being sometimes a sexual character, and in life they are often green (*Hæmatopota*) or golden green (*Chrysopilus*), and in many species of TABANIDÆ, ASILIDÆ and some other groups bear brown or purple bands. In many groups the front facets are from just perceptibly to very considerably larger than the rest in the ♂, and of uniform and smaller size in the ♀, but in the PIPUNCULIDÆ the front facets, though enlarged more than usual in the ♂, are yet more enlarged, and to an enormous extent, in the ♀. In some PUPIPARA the eyes are absent; in CYRTIDÆ and PIPUNCULIDÆ they occupy practically all the head, no other parts except the antennæ being visible in profile in some species of both families.

Three ocelli are normally present in all the BRACHYCERA, but they are occasionally absent (CONOPINÆ).

The lower part of the head, or epistome, exhibits a wide range of shape and size, from being barely or not at all produced beyond the eyes in profile either forwards or downwards (as in most PIPUNCULIDÆ) to forming a long strong conical rostrum (*Nemotelus* in STRATIOMYIDÆ; *Rhingia*, *Volucella*, *Lycastris* in SYRPHIDÆ). The face frequently has a central bump, as in most SYRPHIDÆ, or it may be less prominent, gently curved, or flattened. The mouth-parts attain their highest development in the TABANIDÆ, a family in which the females of all the species have the reputation of being blood-suckers. The parts of the female Tabanid mouth consist of the labium or lower lip, a pair of maxillæ and of mandibles, strong piercing organs, and a pair of large, fleshy, conspicuous, approximately conical maxillary palpi.* The proboscis in the BRACHYCERA is usually soft, and formed for sucking the juices of plants or animal matter, but it is not infrequently of enormous length, longer than the whole body and of extreme

* Compare 'Indian Diptera,' i. p. 18.

slenderness, and in this state either adapted for piercing the skin (PANGONIA) or for imbibing the juices of flowers (NEMESTRINIDÆ, CYRTIDÆ, and many BOMBYLIDÆ). Occasionally it is long, rigid, and geniculate (CONOPIDÆ). Biting flies are distributed throughout many brachycerous and cyclorrhaphous groups. *Symphoromyia*, in LEPTIDÆ, has been definitely proved to bite man severely on occasions; the TABANIDÆ generally confine their unwelcome attentions to the larger mammals, though one genus, *Hæmatopota*, widely distributed throughout the world, its natural home being apparently Africa, is very prone to attack man. The strong horizontal horny proboscis of the *Stomoxys* group of true Muscinids is well known, as are also the tsetse-flies (*Glossina*) inhabiting Africa, these being the carriers of sleeping-sickness. *Philæmatomyia*, a genus of Muscinid flies, possesses a circlet of teeth-like projections at the tip of the proboscis with which, even if unable actually to pierce the skin, it can easily enlarge an abrasion already made. The proboscis in not a few genera is rudimentary, in some almost obsolete, as in ŒSTRIDÆ, the members of which family cause cattle instinctively the greatest terror on their approach for the purpose of depositing their eggs on the animals' mouths, nostrils, etc. An isolated case occurs here and there of a genus with a strong rigid proboscis in a group in which the organ is normally soft and fleshy, as *Drymeia* in the ANTHOMYINÆ. The ASILIDÆ and EMPIDÆ are two other extensive families generally possessing a rigid horny proboscis, with which they easily pierce and carry off their prey, consisting of softer Diptera and other insects. The labella, sometimes called "sucker-flaps," vary in size, shape, and strength, sometimes being small and soft, in other cases acting as organs of attrition to rub off small particles of food.

The palpi, apart from those of the NEMATOCERA, consist usually of two joints, in some highly specialized families of one only, these being the maxillary pair, the labial palpi being considered to be absent in the Diptera. Though large and prominent in some families (TABANIDÆ), it is often difficult in others (BOMBYLIIDÆ, THEREVIDÆ, ASILIDÆ) to examine them without removing the dense furry or bristly pubescence characterising these groups. However, in most of the BRACHYCERA the location of any genus or species can be readily ascertained without reference to these organs. They are normally porrect, *i. e.*, directed horizontally forwards, especially in the blood-sucking Muscids, but frequently project more or less downwards, and they may be present or absent, respectively, in genera of considerable affinity, whilst in the CYRTIDÆ they are generally obsolete.

As regards the antennæ, a gradual change takes place from the many-jointed elongate flagellum of the NEMATOCERA to the compact three-jointed form of the bulk of the remainder of the Diptera, the 3rd joint often being the only conspicuous one.* In the

* For comparative notes on the antennæ in NEMATOCERA and BRACHYCERA, see 'Indian Diptera,' i. p. 20.

earlier families of the BRACHYCERA (STRATIOMYIDÆ, TABANIDÆ, some LEPTIDÆ, etc.) the third joint is usually annulated, that is, faintly separated by more or less distinctly impressed lines into several divisions, generally eight or five, and in this character considerable resemblance is apparent to the nematocerous families BIBIONIDÆ, SIMULIIDÆ, and RHYPHIDÆ. These annulations in subsequent familes of BRACHYCERA gradually disappear in an obviously single elongate joint, as in many BOMBYLIIDÆ, THEREVIDÆ, and ASILIDÆ, with or without a more or less distinct one- or two-jointed apical style; and in later families still, the 3rd joint is further shortened and may bear either a style or arista.

The arista, the bristle-like hair situated on the upper side of the 3rd joint, makes its appearance in the very first brachycerous family, the STRATIOMYIDÆ,* and is present in one or more genera in probably all the subsequent families, with a few exceptions (TABANIDÆ, ACANTHOMERIDÆ, SCENOPINIDÆ, MYDAIDÆ, and APIOCERIDÆ), and of these, all except the first are groups of quite limited extent. The arista is at first (STRATIOMYIDÆ, LEPTIDÆ) mainly apical or subapical, afterwards either apical or dorsal in the same family, and, finally, mainly dorsal (DOLICHOPODIDÆ), which is its normal nature in the remaining brachycerous families and in the CYCLORRHAPHA. The arista may be quite bare, pubescent to a varying degree, or conspicuously plumose. In the great majority of BRACHYCERA the two basal antennal joints are differentiated from the 3rd in the nature of the scapal joints in NEMATOCERA, and are usually short, bearing short bristles, cylindrical or, especially the 2nd, more or less cup-shaped; but in the 3rd joint the most varied forms exist even in a single family, this being especially the case in the STRATIOMYIDÆ, BOMBYLIIDÆ, and SYRPHIDÆ. Briefly, the 3rd joint may be elongate-cylindrical (annulated or not), strap-shaped, filiform, tapering, conical, tooth-shaped, oblong, rounded, oval, reniform, globular, or of irregular shape. In one aberrant genus (*Rhachicerus* in LEPTIDÆ) it is strikingly pectinate, recalling *Pselliophora* in the NEMATOCERA, whilst in *Talarocera*, a genus of North American Tachinids, the 3rd joint in the female is of an extraordinarily fantastic shape. In the CYCLORRHAPHA the two basal joints are normally as in the BRACHYCERA, though the 3rd joint again shows the same extreme range of variety in the two largest families, SYRPHIDÆ and MUSCIDÆ, but remains of remarkably uniform, though peculiarly characteristic, form in others (PIPUNCULIDÆ, PLATYPEZIDÆ). In these groups it may bear a short style or an arista. The 1st and 2nd antennal joints sometimes depart from their more or less general form, the former being exceedingly long and cylindrical in *Systropus* and conspicuously so in *Stratiomyia*, the 2nd showing unusual development in certain genera.

Coming to venation, it will be observed that in the BRACHYCERA

* The only nematocerous family in which the arista appears is the ORPHNEPHILIDÆ, a group of about half a dozen species, and as it consists of several joints it is perhaps not truly identical.

several characters adopt nearly the opposite form to that in the NEMATOCERA. Of these perhaps the principal is the anal cell, which is always wide open in the NEMATOCERA, normally widening towards its tip, whereas in the BRACHYCERA it normally contracts towards its tip, frequently very strikingly so; and in a large number of genera it is completely closed more or less near the wing-margin, either by the gradual approximation of the 5th and 6th veins or by the lower branch of the former turning down, frequently at a sharp angle or well-rounded curve, often in the latter cases closing the cell some distance from the margin of the wing. In the higher families of BRACHYCERA the anal cell is very elongate, extending generally to the wing-margin, but in subsequent families, notably the EMPIDÆ, it is considerably shortened through the almost or quite recurrent ending of the lower branch of the 5th vein in the anal vein at or before the middle of the latter, whilst in DOLICHOPODIDÆ and LONCHOPTERIDÆ it is shorter still. It increases in length again in two out of the three first families of the CYCLORRHAPHA, though it is short in one of them (PLATYPEZIDÆ), whilst in the higher Muscids it is always comparatively short, and in the lower MUSCIDÆ normally short or absent, although conspicuous exceptions occur (some ORTALINÆ and TRYPETINÆ, for example). In the CONOPIDÆ, one of the two families* that may be regarded as forming the transition from the BRACHYCERA-like CYCLORRHAPHA to the MUSCIDÆ (*s. latiss.*) it is long in the CONOPINÆ and short in the MYOPINÆ, which tends to prove the intermediate nature of the CONOPIDÆ.

The auxiliary and 1st vein are generally obviously present, separate and simple, but in some groups of ACALYPTRATA they are frequently coalescent.† The 2nd vein is nearly always very prominent and simple; the 3rd, which is nearly always simple in NEMATOCERA, is normally forked in the higher families of BRACHYCERA. The 4th and 5th veins in these latter families are generally both forked, but in the highest three families of the CYCLORRHAPHA (PLATYPEZIDÆ, PIPUNCULIDÆ, and SYRPHIDÆ) there are normally only three endings to the two veins, in which cases it is the 5th vein that is considered forked, its upper branch forming part or the whole of the hinder side of the discal cell. This cell in the NEMATOCERA is confined to the TIPULIDÆ and RHYPHIDÆ—that is to say, the two families generally placed next to the BRACHYCERA, in which latter the cell is a standard feature, though exceptions occur (some EMPIDÆ),—and it is prominently retained in the calyptrate Muscids and the bulk of the ACALYPTRATA. The anterior cross-vein is nearly always present, though rudimentary in some STRATIOMYIDÆ; but the posterior cross-vein disappears after the higher families are passed, if the theory of the forked 5th vein be upheld.‡

* The other being the ŒSTRIDÆ.

† They are then called the 1st vein, following Schiner.

‡ It may as well be stated here that I am by no means convinced that this is the correct interpretation.

The brachycerous venation attains its most perfect form perhaps in the TABANIDÆ, and it is elaborated most in the ASILIDÆ, NEMESTRINIDÆ, MYDAIDÆ, and CYRTIDÆ (despite the latter family also exhibiting some very simple venational types), being quite eccentric in the last three families, many of the longitudinal veins in the hinder part of the wing running more or less parallel to the hind margin; whilst in certain genera of NEMESTRINIDÆ an additional character is the net-like system of very numerous small cross-veins. An isolated instance of a cell being subdivided by numerous cross-veins occurs in *Lycastris* (SYRPHIDÆ), in which the subcostal cell is so divided.

After the BRACHYCERA the venation becomes more simplified, and is, speaking broadly, remarkably uniform in type throughout the MUSCIDÆ, in the higher groups of which (Tachinids, Dexiids, Sarcophagids, and Muscinids) the 1st posterior cell is quite or nearly closed by the upturned apical section of the 4th vein, whilst in the ANTHOMYINÆ and the various subfamilies forming the ACALYPTRATA that cell is broadly open. Numerous minor differences occur in these groups, but the type of venation remains the same. Passing on to the PUPIPARA, some genera may be observed to possess peculiar venation, but they need not be discussed here.

The general form of the body exhibits the widest diversity. The head may be variously proportioned to the body, perhaps attaining its minimum of size in the CYRTIDÆ and its maximum in PIPUNCULIDÆ, but normally it is approximately of the same width as the thorax and usually more or less semicircular. The thorax and abdomen both vary greatly in length and breadth in relation to one another, and range from the flattened form in some STRATIOMYIDÆ to the humped thorax in many EMPIDÆ and to the globular or balloon-like abdomen in most CYRTIDÆ, the whole body in many species of the latter family being practically spherical. As regards vestiture, a short pubescence over the greater part of the thorax and abdomen is common to the vast majority of genera in BRACHYCERA, a few restricted groups being for all practical purposes absolutely bare (*Scenopinus*). The earlier families are eremochætous—that is, possess no distinct bristles of a chætotactic nature on the head or thorax; but such bristles gradually appear in successive families, as witnessed by the apical spurs on the tibiæ in LEPTIDÆ, spicules or stick-like spines on the legs in some BOMBYLIIDÆ, and real bristles and spines in that family, in DOLICHOPODIDÆ, EMPIDÆ, and THEREVIDÆ, culminating in the powerful chætotactic system in most ASILIDÆ; after which these characters gradually diminish or practically disappear (as in PIPUNCULIDÆ and SYRPHIDÆ), reappearing and attaining probably their greatest development in the order in the TACHININÆ, the highest group of the MUSCIDÆ (*s. latiss.*). The pubescence, always soft in STRATIOMYIDÆ, attains its greatest development perhaps in BOMBYLIIDÆ, THEREVIDÆ, and ASILIDÆ; and true

scales, covering sometimes extensive parts of the body or legs, are common in many genera of BOMBYLIIDÆ and THEREVIDÆ.

The vestiture of the legs varies from practical bareness, through the whole gamut of soft and fine to a long and ragged pubescence, bristles, spines, scales, and tooth-like serrations (the latter generally confined to the underside of the femora), all of them often forming good generic or specific characters. As a rule, aerial species (that is, those that are frequently on the wing and addicted to hovering) possess soft pubescence on the body and weak legs devoid of strong bristles, as they are presumably employed mainly for alighting; whereas, on the contrary, pedestrian (which frequently means predatory) species mostly possess strong bristles or spines, and powerful legs capable of running swiftly and surely and of holding their prey when captured, and possessing comparatively reduced powers of flight. Compare, for instance, a *Bombylius* with an average Asilid. A peculiar character called "touch hairs" is present in certain genera of LEPTIDÆ, TABANIDÆ, and some other widely divergent groups, and this is dealt with under the genus *Leptis*.*

The genitalia in the BRACHYCERA are usually more or less concealed in most families or are of simple form, but they afford in the ♂ good taxonomic characters in ASILIDÆ and DOLICHOPODIDÆ, being fully free in the latter family; but the genitalia are always more uniform in the ♀ and of little value for classification in that sex.

Life Histories.†

Although the metamorphoses of the Diptera in general are still but imperfectly understood, considerable progress in their study has been made since the older writers (Réaumur, De Geer, etc.) first broke the ice, and the early stages of a comparatively large number of common species have been worked out. Taking the order as a whole, the larva may be described as maggot-like, though extreme forms of shape are far from uncommon. It generally consists of a head segment and twelve others, of which the three anterior ones are presumed to represent the thorax of the perfect insect. The head segment is often so indefinitely presented that Brauer sometimes uses the expressions "head capsule" and "jaw capsule." Even when obviously present the head is sometimes most disproportionately minute or placed below the anterior end of the body so as to be invisible from above; also not infrequently in the flesh-feeding maggots no head can be detected with certainty. These latter forms are called acephalous,

* These notes on vestiture are compiled chiefly from Verrall.

† These remarks on the early stages are wholly culled from Dr. Sharp's paper (*v.* Verrall, p. 31). This article should certainly be studied by all interested in the subject. In addition to a preliminary general *résumé* of brachycerous larvæ, it offers a translation of Brauer's classification of the families in BRACHYCERA based on larval characters, and, lastly, more detailed information is given on each family or group of families separately.

whilst at the other end of the scale, *i. e.*, those larvæ with unduly large heads, the term eucephalous is applied. The eucephalous kinds are the less common, but they are the normal form in the nematocerous family CULICIDÆ. The head in the larvæ of the majority of brachycerous families exhibits an intermediate type between the extreme forms. Many kinds of larvæ have retractile heads, the front part being completely withdrawable inside the following segment or segments.

Regarding the mouth-parts Brauer, roughly speaking, described the larvæ of the NEMATOCERA as having the jaws moving horizontally, except in cases where the mouth-parts are quite rudimentary, when the larva is peripneustic and 13-segmented. He claims for the BRACHYCERA vertically moving jaws—sucking and boring groups coming also under this division, the head being not well developed. Brachycerous larvæ with rudimentary mouth-parts are amphipneustic or metapneustic, with ten to twelve obvious segments.

The number of body-segments is frequently by no means easy to ascertain, Dr. Sharp stating that there is "no morphological criterion yet discovered by which the segments can be numbered." In some cases, of course, they are obvious enough, whilst in others there are what have been termed intercalary segments, apparently consisting of the undue development of the integument between the orthodox segments, the larvæ of the THEREVIDÆ and SCENOPINIDÆ being instances in which the apparent number of segments approximates to about twenty. The larva with the smallest number of segments appears to be that of the nematocerous family BLEPHAROCERIDÆ, in which only five or six are present.

Locomotion is usually effected by means of pseudopods, as jointed legs are unknown through the whole order of the Diptera, these pseudopods being transverse swellings on the under (or sometimes both upper and under) surface of the body, and they may also be furnished with rows of bristles or small wart-like projections, placed on a varying number of segments according to the species.

The spiracles in Dipterous larvæ consist of a posterior pair placed near or at the tip of the body, where there is often some special development for their protection. Larvæ with only one pair of spiracles, the posterior ones, are called metapneustic; but if in addition there is a pair of anterior ones placed a little behind the head, they are termed amphipneustic; whilst when intermediate spiracles are also present, making, so to speak, three sets in all, they are known as peripneustic.

The pupa-case is ordinarily the dried larval skin, the imago escaping through a longitudinal split occurring between two transverse splits, normally on the 3rd and 5th segments respectively.

Further detailed information will be found under the respective families or genera concerned.

Family STRATIOMYIDÆ.

Head hemispherical or flattened, rather short, usually about as broad as thorax, generally bare. Eyes contiguous in ♂ (occasionally very narrowly separated, *Sargus*, etc.), wide apart in ♀; if hairy in ♂, nearly always bare in ♀; sometimes upper facets enlarged in ♂, all facets equal in ♀; posterior orbits often very broad and conspicuous. Frons seldom prominent, but lower part of head forming a conspicuous snout in some genera (*Nemotelus*); three distinct ocelli. Proboscis usually short and fleshy, sometimes rudimentary, occasionally long and thin (*Nemotelus*), rarely conspicuous; palpi 1- to 3-jointed, inconspicuous. Antennæ porrect, approximate at base, showing, perhaps, greater diversity of form than in any other family of Diptera, 3-jointed; 3rd joint annulated, forming apparently several (up to eight) annulations; an apical style, often very large, or an apical or subapical arista often present.

Thorax generally quadrangular or roughly oblong or oval, more or less pubescent, moderately or considerably arched; scutellum semicircular or broadened, unarmed or with 2, 4, 6, or 8 spines, occasionally produced into a prominent erect blunt cone or spine (*Monacanthomyia*, *Ceratothyrea*). A strong spine on each side of thorax in some genera (*Ephippium*, *Negritomyia*).

Abdomen of five to seven, sometimes eight, segments; of very varied shape, globular, much broader than thorax (*Pachygaster*, *Acanthina*, *Cyphomyia*); broader and shorter than thorax (*Culena*); quadrate (*Stratiomyia*, *Odontomyia*); oblong or oval, and about as long as thorax (*Evaza*, *Tinda*, and many others); or very elongate, linear, cylindrical, or flattened (*Sargus*, *Hermetia*, *Stratiosphecomyia*). Genital organs usually inconspicuous.

Legs normally of moderate length and strength, or rather weak; destitute of bristles or spines (except for a serration below hind femora in some XYLOMYINÆ); generally bare or with pubescence mainly confined to the femora; tibiæ unspurred, except in XYLOMYINÆ and some BERINÆ.

Wings generally with the characteristic venation of the family (except XYLOMYINÆ and BERINÆ); anterior veins (subcostal, 1st, 2nd, and 3rd longitudinals) crowded together in fore part of wing and the posterior veins very faint, often not reaching wing-margin. In typical genera costa not reaching wing-tip, ambient vein absent; 3rd vein simple or forked, fork occurring at some distance beyond discal cell, both branches ending in costa before wing-tip; discal cell always present, lower side often formed of upper branch of 5th vein, in which case posterior cross-vein absent; anterior cross-vein present, not distally further than middle of discal cell, joining, except in SARGINÆ, 3rd vein to discal cell. In CLITELLARIINÆ, 2nd vein apparently anastomosed with 3rd or may be considered absent. In SARGINÆ, anterior cross-vein joining præfurca and discal cell, as 2nd vein originates much later than

usual. Præfurca originating in this family about opposite base of discal cell (except in BERINÆ and XYLOMYINÆ); whereas in all other families of BRACHYCERA it originates much sooner. In BERINÆ and XYLOMYINÆ all the veins attain the wing-margin;* præfurca quite distinct; costa nearly or quite reaching wing-tip; ambient vein more or less distinct; 4th posterior cell closed in XYLOMYINÆ. In all subfamilies, membrane of wing always ribbed or wrinkled; squamæ variable in size, thoracic pair sometimes absent.

The STRATIOMYIDÆ are invariably bare of bristles or spines (except the side thoracic spines in a few genera), but often possess dense soft pubescence extending over the whole body and the femora. The crowding together of the anterior veins and the extremely wide variation of form in the antennæ (perhaps greater than in any other family of Diptera) are their principal characters. In the BERINÆ and XYLOMYINÆ the venation takes the form of the other allied families and the antennæ are more uniformly constructed, elongate or subconical, with distinctly annulated 3rd joint. The family is closely allied to the LEPTIDÆ and TABANIDÆ and to the small family of gigantic flies, the ACANTHOMERIDÆ, known only from South America.

Life-history.—The larvæ show considerable variation, though easily recognised when once seen, and those of some species are popularly known as rat-tailed maggots, as are also those of the ERISTALINÆ. They are 12-segmented, including head, hemicephalous or conical, very elongate, rather leathery, and more or less flattened. They live in earth, dung, semi-liquid or decaying matter, and many are aquatic; in the latter case the eggs are laid on plants above the surface of the water. No pseudopods; terminal spiracles not visible, placed wholly inside a chamber which has generally a closed or obscure aperture. Pupa coarctate, in which character this family differs from all other BRACHYCERA, the imago escaping through transverse slits on the 3rd and 5th segment and a longitudinal slit between them.

Many species hibernate in North Europe, but very possibly do not do so in the Tropics. The life-histories of several European species are well known. The imagines frequent grass and low herbage in marshy situations and, generally speaking, are sluggish in habits, though some have a very rapid flight in hot sunshine.†

Table of Subfamilies.

1. Abdomen of at least seven obvious segments.	2.
Abdomen of five, or at most six, segments. .	3.
2. Præfurca beginning at about opposite base of discal cell; 4th posterior cell wide open .	BERINÆ, p. 89.
Præfurca beginning considerably before base of discal cell; 4th posterior cell closed	XYLOMYINÆ, [p. 96.

* Except for an abortive branch of the 4th vein in some BERINÆ.

† Additional and more detailed information occurs under the various subfamilies or genera concerned.

3. Fourth vein with only two terminations (*i.e.*, only two true veinlets issuing from discal cell, the apparent 3rd veinlet being the upper branch of the 5th vein) .. . . [p. 19. PACHYGASTRINÆ,
Fourth vein with three terminations (*i.e.*, three true veinlets issuing from discal cell); upper branch of 5th vein either separated from discal cell by the posterior cross-vein being present, or in punctiform contact with that cell when posterior cross-vein is absent .. .. .. 4.
4. Anterior cross-vein joining præfurca to discal cell. SARGINÆ, p. 72.
Anterior cross-vein joining 3rd vein, as usual, to discal cell . 5. [p. 56.
5. Posterior cross-vein present STRATIOMYINÆ,
Posterior cross-vein absent CLITELLARIINÆ, [p. 38.

The line of demarcation between the two last subfamilies is very indefinite, and, as more than one author has suggested, they might well be united into a single subfamily. The posterior cross-vein is often a variable quantity even in groups in which it is technically present—for instance, it is absent in *Ptecticus australis*, Sch., though present in the other Indian species. Williston sinks the alleged subfamily HERMETIINÆ in CLITELLARIINÆ and his view is adopted here.

Subfamily PACHYGASTRINÆ.

Head comparatively small; eyes generally bare; antennæ of very varied form, branched (*Ptilocera*), elongate (*Tinda*, etc.) filiform (*Stratiosphecomyia*), globular (*Pachygaster*), or of irregular shape.

Thorax subquadrate, oval; scutellum unarmed or with two or four marginal spines; sometimes produced upwards or hindwards into a strong blunt cone. *Abdomen* 5- or 6-segmented, of very varied shape; often exceedingly broad, much broader than thorax, globular; sometimes oval or oblong, or much elongated and more or less cylindrical. *Legs* comparatively short, slender, smooth. *Wings* with 3rd vein simple or forked; posterior cross-vein absent through 5th vein forming hinder side of discal cell; 4th vein with only two veinlets. Four posterior cells, united on wing-margin.

The essential character of this subfamily is the presence of only three veins apparently issuing from the discal cell, the lower one being the upper branch of the 5th vein. Mostly bare species.

*Table of Genera.**

[p. 33.
1. Antennæ branched .. .. PTILOCERA, Wied.,
Antennæ of various forms, never branched. 2.

* For table of Oriental genera, *vide* Brunetti, Rec. Ind. Mus. i, p. 89.

2.	Eyes pubescent.	ACANTHINA, Wied.,
	Eyes entirely bare	3. [p. 26.
3.	Scutellum unspined, or produced conically upwards	4.
	Scutellum 2- or 4-spined, never conically upturned	8.
4.	Abdomen elongate, linear, much longer than thorax; antennæ conspicuously long, filiform	[Brun., p. 36. STRATIOSPHECOMYIA,
	Abdomen very short, thick, rounded; antennal 3rd joint rounded or shortly elongate, never conspicuously so	5. [p. 21.
5.	Third vein unforked.	ZABRACHIA, Coq.,
	Third vein forked ..	6. [p. 20.
6.	Scutellum not upturned	PACHYGASTER, Mg.,
	Scutellum distinctly conically upturned	7. [p. 24.
7.	Antennæ filiform, longer than head	ACRASPIDEA, Brauer,
	Antennal 3rd joint large, round.	MONACANTHOMYIA, [Brun., p. 23.
8.	Scutellum with two very short spines	WALLACEA, Dol.,
	Scutellum 4-spined	9. [p. 24.
9.	Third antennal joint with elongate style	TINDA, Walk., p. 29.
	Third antennal joint with pubescent arista.	10.
10.	Abdomen barely broader than thorax	EVAZA, Walk., p. 31.
	Abdomen much broader than thorax	CRASPEDOMETOPON, [Kert., p. 28.

Genus **PACHYGASTER**, *Mg.*

Pachygaster, Meigen, Ill. Mag. ii, p. 266 (1803).
Vappo, Latreille, Hist. Nat. Crust. Ins. xiv, p. 343 (1804).
Neopachygaster, Austen, Ent. Month. Mag. xxxvii, p. 245 (1901).

GENOTYPE, *Nemotelus atra*, Panz.; by original designation.

Head semicircular; eyes large, contiguous in ♂ (except in rare instances), practically bare, posterior orbits broad. Proboscis and palpi small and inconspicuous. Antennæ short, 3rd joint rounded, with four indistinct annulations and long subapical pubescent arista. *Thorax* large, broadened hindwards, transverse suture deep, V-shaped, behind which the surface is somewhat inflated on each side; scutellum subtriangular, unspined. *Abdomen* much broader and barely longer than thorax, subglobular, 5-segmented; genitalia small. *Legs* simple, nearly bare; femora and metatarsi long. *Wings* with 1st and 2nd veins short, the latter ending barely beyond middle of costa; 3rd vein normally forked, both branches ending well before wing-tip; discal cell large; 4th vein with only two terminations; posterior cross-vein absent, as 5th vein forms hinder side of discal cell; anal cell closed far from wing-border.

Range. Europe, North America, Orient.

Life-history. That of several European species is known. The larva lives in rotting tree-trunks and probably feeds either on the decaying wood or the frass produced by wood-boring Coleoptera.

There is only one Indian species in the restricted genus *Pachygaster*, namely, *P. annulipes*, sp. nov. Macquart's *P. rufitarsis*,* from Pondichery, cannot belong to this subfamily, as, according to the plate, it possesses three endings to the 4th longitudinal vein, apart from the upper branch of the 5th vein.

1. **Pachygaster annulipes**, sp. nov.

♀ *Head*: frons between one-third and one-fourth of the head, shining black; face, which is conspicuously invaginated, with greyish dust; back of head shining black. Antennæ with 1st joint black, the remainder wholly bright yellow, with long arista. Proboscis dark. *Thorax* and scutellum shining black, dorsum of both with very short yellowish pubescence, which does not quite extend to the anterior margin of the former. *Abdomen* shining black, with sparse short pale yellowish pubescence; venter black, with sparser but slightly longer pubescence. *Legs* yellowish to tips of tarsi; a rather broad subapical black or blackish brown ring on all the femora. *Wings* pale yellowish grey; stigma darker yellow; halteres yellowish.

Length, $2\frac{1}{4}$ mm.

Described from a single ♀ from Margherita, Assam.

Type in the Indian Museum.

Genus **ZABRACHIA**, *Coq.*

Zabrachia, Coquillett, Bull. N. Y. State Mus. xlvii, p. 585 (1901).

GENOTYPE, *Zabrachia polita*, Coq. (North America).

Differing from *Pachygaster* in the unforked 3rd vein. Some degree of latitude must be allowed in my revised view of this genus, in which the species are chiefly united by the above primary character. Eyes in ♂ contiguous (*minutissima*, Zett., a European species) or narrowly separated (*annulifemur*, *albipes*). Scutellum not upturned (*minutissima*), barely upturned and thickened (*albipes*), or produced upwards into a short blunt cone (*annulifemur*). Third antennal joint transversely elliptical (*polita*, the type-species from New York) or as in *Pachygaster*.

Range. India, North America.

Z. albipes has wholly pale yellow legs, while *Z. annulifemur* has a broad dark band on all the femora.

2. **Zabrachia albipes**, *Brun.* (Pl. I, figs. 1, 2.)

Pachygaster albipes, Brunetti, Rec. Ind. Mus. i, p. 102, ♀ (1907).
Pachygaster infurcata, de Meijere, Tijd. v. Ent. l, p. 232, ♀ (1907).

♀ *Head* and front shining black, with a brilliant white streak on each side of lower part of head; antennæ and proboscis orange-

* Dipt. Exot. Supp. i, p. 57, pl. vi, fig. 3 (1846).

yellow. *Thorax* and *abdomen* shining black, with short, sparse, silvery grey hair, which is a little thicker and mixed with gold hairs on dorsum of thorax; abdomen uniformly black. *Legs* pale yellowish white, tips of tarsi faintly blackish. *Wings* quite clear; veins on anterior part and the stigma pale yellowish; halteres white.

Length, 2–2½ mm.

Described from four ♀ ♀ in the Indian Museum from Calcutta.

My original description was insufficient, and my not noting the unforked 3rd vein probably prevented de Meijere from recognising my species in his *infurcata*, described from Java. The white tomentose stripe on the side of the thorax mentioned by de Meijere is present, though liable to be not readily distinguished from the general whitish pubescence of the pleuræ.

3. **Zabrachia annulifemur**, sp. nov.

♂ ♀ *Head* shining black, bare; frons at level of antennæ about one-fifth of the head in ♂, in ♀ one-fourth width of head, sides parallel except near vertex and towards antennæ; visible only from above, a pair of moderate-sized oval silvery-white spots placed lengthwise, nearly contiguous, one above each antenna; face with broad white-dusted band contiguous to lower inner eye-margins. Antennæ brownish orange, upper side of 3rd joint blackish at tip. *Thorax*, scutellum, and metanotum shining black, all with very short whitish pubescence; scutellum produced upwards into a short blunt cone. *Abdomen* shining black; dorsum and venter with similar pubescence to that of thorax, but less obvious; genitalia brownish orange, with a few stiff hairs. *Legs* yellowish, front coxæ more brownish at base; all femora with a broad blackish ring leaving base broadly, and tips narrowly, pale. *Wings* colourless, veins and stigma pale yellow; halteres yellowish, clubs shining milk-white.

Length, barely 3 mm.

Described from three ♂ ♂ in the Pusa collection (including *type* sent to British Museum) from Annandale, Simla District, "on leaves," x. 1911; and one ♀ in the Indian Museum from Simla, 7000 ft., 9. v. 09 (*Annandale*).

This species must be near the *femorata* variety of de Meijere's *P. infurcata*, but should be distinct. In *P. albipes* the ♂ frons is one-sixth the width of the head, with practically parallel sides, including the face also, there being only the very slightest widening towards the vertex and towards the mouth-opening. In the ♀ the frons and face form one-third of the head, being distinctly but slightly broader towards vertex and mouth. In *P. annulifemur*, ♂, the frons is one-fifth the width of the head with less parallel sides, and in the ♀ one-fourth. These differences should effectually separate the species and prevent the latter from being confused with the *femorata* variety of *infurcata*, Meij.

Genus **MONACANTHOMYIA**, *Brun.*

Monacanthomyia, Brunetti, Rec. Ind. Mus. vii, p. 448 (1912).

GENOTYPE, *Monacanthomyia annandalei*, Brun.

Allied to *Pachygaster*, Mg., from which it differs by the formation of the scutellum, which is produced upwards so as to form a very large conical base, from which it is continued upwards in the form of a long strong spine with blunted tip. It differs from the allied *Acraspidea*, Brauer, by the 3rd antennal joint being large and round instead of filiform and longer than the head. The type-species is the only one known.

Range. India.

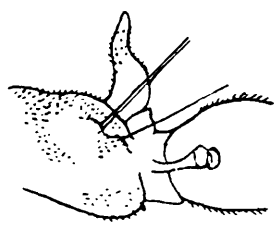

Fig. 1.—*Monacanthomyia annandalei*, Brun., scutellum in profile.

4. **Monacanthomyia annandalei**, *Brun.*

Monacanthomyia annandalei, Brunetti, Rec. Ind. Mus. vii, p. 448 (1912).

♂ *Head* with vertex triangular, elevated, the three ocelli distinct, reddish; frons between one-fourth and one-fifth width of head, nearly linear, shining black, with (seen from above) two small, nearly contiguous, oval, silvery-grey-dusted spots a little above the antennæ; eyes with very small uniform facets; face shining black, lower eye-orbits silver-dusted; back of head blackish, lower posterior eye-orbits with silvery reflections and a few very short snow-white hairs. Proboscis short, narrowed at base, pointed at tip, yellow, microscopically pubescent. Antennæ yellow; third joint very large, round, with a rather long apical thickened bristle. *Thorax* shining black, with microscopic grey hairs, which on the dorsum are intermixed with (or possibly wholly replaced by) yellow hairs, all microscopic. Scutellum shining black, with microscopic whitish and a few yellow hairs. *Abdomen* shining black, with microscopic snow-white hairs; venter similar; genitalia very minute. *Legs* with basal half of coxæ and a broad band occupying nearly all the femora, except base and tips, black or blackish brown, remainder of coxæ and femora yellowish; tibiæ and tarsi white. *Wings* very pale grey, highly iridescent; stigma yellow; basal half of costa and 1st longitudinal vein much blacker than the remainder of the veins; halteres with the stem yellowish, the club milk-white, rather large.

Length, 2 mm.

Described from a perfect ♂ in the Indian Museum, captured by Dr. Annandale at Kurseong, Darjeeling District, 4700 ft., 15. iv. 1911, on a window.

Genus **ACRASPIDEA**, *Brauer.*

Acraspidea, Brauer, Denks. K. Ak. Wiss. Wien, xliv, p. 75 (1882).

GENOTYPE, *Acraspidea felderi*, Brauer.

"Body oval, with short weak legs; antennæ longer than head, filiform, pubescent, placed at middle of head in profile; 1st antennal joint longer than the short 2nd; 3rd long, narrow, with four indistinct annulations, and with a terminal, shortly plumose, long, filiform bristle; scutellum unarmed, parabolic, obliquely upturned. Abdomen 5-segmented, round; all tibiæ without spurs. Only three endings to 4th vein (1st, 2nd, and 4th); four posterior cells.

"Differs from *Rosapha* by the unarmed scutellum and from *Tinda* by the position of the antennæ." *

Range. Ceylon.

The genotype is the only known species.

5. **Acraspidea felderi**, *Brauer.*

Acraspidea felderi, Brauer, Denks. K. Ak. Wiss. Wien, xliv, p. 76 (1882).

"♂. *Head* black, with short black pubescence; face broad and long, shining; eyes contiguous above; ocelli on a tubercle; 1st and 2nd antennal joints yellow, base of 3rd and the flagellum brown, or entirely black, with concolorous short pubescence. *Thorax* robust, inflated, dorsum roughened and punctate; a triangular spot of short pale yellow pubescence extending from the suture down to the whole breadth of the hind border. *Abdomen* black, broader than thorax; genitalia small but prominent, brown. *Legs* yellow, femora with a brown ring; metatarsi very long, middle pair very thin but shorter than the tibiæ. *Wings* clear; costa brownish, submarginal cell distinctly smoke-grey nearly up to the clear wing-tip, so that the marginal cell forms a white spot on the costa between the darker parts; anal cell broad, closed at some distance from the border; veins brown; halteres pale yellow.

"*Length*, 5–6 mm.

"Rambodde, Ceylon (*Nietner*)."

Genus **WALLACEA**, *Dol.*

Wallacea, Doleschall, Nat. Tijd. Ned. Ind. (4) xvii, p. 82 (1858); de Meijere, Tijd. v. Ent. l, p. 234 (1907).

Gabaza, Walker, Proc. Linn. Soc. Lond. iii, p. 80 (1859).

GENOTYPE, *Wallacea argentea*, Dol.; by original designation.

Head about semicircular, as broad as thorax; eyes bare, in ♂ contiguous for some distance; frons broad in ♀, sides parallel

* A translation of Brauer's description.

Antennæ placed just above middle of head, first two joints short, normal; 3rd elongate, twice as long as first two together, 5-annulated, with a style as long as the 3rd joint itself. Proboscis and palpi small. *Thorax* subquadrate, very arched, slightly inflated on each side behind the very distinct suture; scutellum large, thick, bluntly pointed at tip and projected somewhat upwards, with two hardly distinct short blunt spines. *Abdomen* rounded, thick, as long as but distinctly broader than the thorax. *Legs* short, simple, slender. *Wings* normal; discal cell very large.

Range. India and Ceylon.

The genotype is the only known species.

6. **Wallacea argentea,** *Dol.* (Pl. I, fig. 3.)

Wallacea argentea, Doleschall, Nat. Tijd. Ned. Ind. xvii, p. 82 (1858); Brunetti, Rec. Ind. Mus. i, p. 101 (1907).
Gabaza argentea, Walker, Proc. Linn. Soc. iii, p. 80 (1859).
Pachygaster nigrofemorata, Brunetti, Rec. Ind. Mus. vii, p. 499 (1912).

♂ ♀ *Head* with the eyes in ♂ practically contiguous for about one-third of the distance from vertex to antennæ, leaving a slightly elongate vertical shining black triangle and a much smaller frontal triangle which is shimmering white, as are the sides of the face; rest of face and lower part of head black; proboscis dark brownish yellow; antennæ orange or yellowish; 3rd joint rather broader in ♀ than ♂, with six annulations, the two basal ones the broadest; style whitish, 2-segmented, 1st very minute, tip of 2nd curved. In ♀, frons shining black, sparse short whitish hairs on upper part; two small round white hair-spots contiguous to eyes just above level of antennæ; margins of face with a thin line of snow-white hairs. *Thorax* shining black, in ♂ with broad band of golden yellow, almost tomentose pubescence on hinder half of dorsum, generally but not always reaching side-margins and always extending as far as the scutellum, which is wholly black; the whole dorsum similarly covered in ♀, as is the scutellum also; sides with very sparse inconspicuous pale pubescence. *Abdomen* moderately shining black, with very short whitish pubescence, which is sparser in the ♀; venter shining black, bare. *Legs* yellow; femora black, tips narrowly yellowish; tibiæ a little brownish about the middle; extreme tips of tarsi brownish; femora with soft hairs, tibiæ and tarsi minutely pubescent. *Wings* clear; stigma, anterior veins, and halteres yellowish.

Length, about 3 mm.

Described from a long series in the Pusa and Indian Museum collections. Pusa, 22. v. 1908, in bark of *Erythrissa* sp., 17. xii. 1914, under bark of *Ficus lavica*, 15. ii. 1916, on rotten papaya stem; Katihar, 12. x. 1907; Bombay, vii–ix. 1912; Calcutta, 8. i. 1906, 22. i. 1908, 14. iii. 1907, 6. ii. 1908; Pollibetta, Coorg, 15–26. v. 1914, 24. x. 1915, 16. xi. 1915 (*Fletcher*).

Genus **ACANTHINA**, *Wied.*

Acanthina, Wiedemann, Auss. Zweifl. ii, p. 50 (1830) [preocc. Fisch. (1806)].
Acanthinia, Macquart, Hist. Nat. Dipt. i. p. 240 (1834) [*lapsus*].
Artemita, Walker, List Dipt. Brit. Mus. v, Supp. 1, p. 61 (1854).
Acanthinomyia, Hunter, Tr. Am. Ent. Soc. Phil. xxvii, p. 129 (1901).
Cibotogaster, Enderlein, Zool. Anz. xliii, p. 305 (1914).

GENOTYPE, *Clitellaria elongata*, Wied.; by Brauer's designation (1882).

Head more than semicircular, as broad as anterior part of thorax; eyes hairy, contiguous or subcontiguous for a short distance in ♂, facets of uniform size in both sexes; frons in ♀ rather narrow, sides nearly parallel, postocular orbit in ♀ broad. Antennæ placed low down on head at tip of frontal prominence, barely above level of lower part of eyes; 1st and 2nd joints short, 3rd elongate, cylindrical, with short apical style. Proboscis and palpi small. *Thorax* moderately arched, much broader behind, anterior corners rounded; scutellum broad, nearly semicircular, 4-spined. *Abdomen* rounded, thick, much broader than thorax; genitalia small. *Legs* slender, simple, moderately long. *Wings* with normal venation.

Range. Orient, Mexico, Central and South America.

As the name *Acanthina* is preoccupied in Mollusca, *Artemita*, Walk., should be used, but I decline to accept changes in well-known names of such long standing. *Cibotogaster*, Ender., erected on slight differences in the last antennal joint, and the shape of the thorax and abdomen, does not appear generically distinct.

The two Indian species are easily known by their size, *azurea* being 8 to 9 mm. long and *argentihirta* only 3 mm.

7. **Acanthina azurea**, *Gerst.*

Acanthina azurea, Gerstaecker, Linn. Entom. xi, p. 335 (1857); Brunetti, Rec. Ind. Mus. i, p. 100 (1908).
Acanthina auricollis, Bigot; Brunetti, Rec. Ind. Mus. i, p. 100 (1907) (*nom. nud.*); Brunetti, *op. cit.* vii, p. 449 (1912), ♂ ♀.
Cibotogaster azurea, Enderlein, Zool. Anz. xliii, p. 305, fig. 11 (antenna, ♂) (1914).
? *Clitellaria obesa*, Walker, Proc. Linn. Soc. Lond. v, p. 232 (1861); Osten-Sacken, Ann. Mus. Gen. xvi, p. 411 (1880), xviii, p. 17 (1882).

♂ ♀. *Head* with eyes in ♂ with dense yellow pubescence above and brown pubescence in front, nowhere actually touching but extremely near each other for a considerable distance, and separating upwards very gradually, leaving a very narrow elongate greyish triangle below the large black ocellar triangle which fills the space from eye to eye; above this the rather large vertical space is orange-brown with a few black bristles; frontal triangle smooth, shining, bare, orange; proboscis, palpi, and labella all bright orange-brown; antennæ with first two joints orange, 3rd

blackish, microscopically pubescent, sometimes orange at extreme base with four distinct annulations and a short two-jointed style; occiput considerably concave, dark, with a little grey pubescence. In ♀ frons $\frac{1}{9}$ width of head, barely broader at vertex and lower end; frontal triangle large, very prominent, shining, bare, bright orange-brown, as is also the very broad posterior border to the eyes; a small brown spot on frons just above the suddenly widened frontal triangle. *Thorax* dark shining blue, punctate, with microscopic black bristles; in ♂ a single median stripe of yellow pubescence, not reaching anterior collar but leaving a shining black spot bare of pubescence, the stripe extending hindwards to middle of dorsum; in ♀ two very narrow longitudinal median stripes, rather approximating to one another, formed of minute whitish pubescence, continued beyond suture a little, where they diverge and broaden, reaching posterior corners of dorsum; a moderately broad transverse stripe of similar pubescence along suture, narrowest in middle: a patch of short golden yellow pubescence on each shoulder and along anterior margin; pleuræ as dorsum, similarly punctate and with a little grey or whitish pubescence, which is silvery white and thickest above front coxæ, on mesopleura just below wing, and on lower part of sternopleura. Scutellum concolorous, similarly punctate, and with greyish pubescence; spines brownish, rather short. *Abdomen* dark shining blue, punctate as thorax; a little grey pubescence about front corners and sides and denser and longer about centre of hinder part of 4th segment and also about base and centre of 5th; genitalia small, brown, two short telescopic cylindrical joints in ♂, two short filaments in ♀; venter deep blue, punctate, with a little greyish pubescence. *Legs*: femora black, with a slight blue or violet tinge and a little whitish-grey hair below; knees narrowly dark brown; tibiæ black or dark brown, tips very narrowly a little paler; tarsi blackish brown, middle pair distinctly paler. *Wings* dark brown, stigma and veins darker; costal cell, discal cell mainly or wholly, base of 4th posterior cell (sometimes base of 3rd or even 2nd also), anal and axillary cells (sometimes hinder part of 2nd basal cell also), clear or nearly so; halteres brownish yellow.

Length, $8\frac{1}{2}$–9 mm.

Described from six ♂♂ and one ♀ in perfect condition from Tura, Garo Hills, Assam, 1500 ft., vii. 1917, and above Tura, 3500 ft., viii. 1917 (*Kemp*); a ♂ from Sadiya, Assam; a ♀ from Karkur Ghat, Nilgiri Hills, 1500 ft., v. 1911 (*H. L. Andrewes*); and a second ♂ from Kohima, Assam, all in the Indian Museum; and a specimen from Coorg, S. India (*T. B. Fletcher*).

This species was given in my first paper on STRATIOMYIDÆ as "*auricollis*, Bigot," which afterwards proved to be merely a MS. name.

The gold pubescence on the front of the thorax and that forming an approximate cross on the thorax in the ♀ rubs off very easily.

8. **Acanthina argentihirta**, *Brun.* (Pl. I, fig. 4.)

Acanthina argentea, Brunetti, Rec. Ind. Mus. i, p. 132 (1907); emended in Corrigendum slip of same date to *argentihirta* (*argentea* preocc. Ost.-Sack. 1886).

♂ *Head* with eyes extending whole height of head, shortly but not thickly pubescent, subcontiguous at nearest point of approach, as the frons at this point is receding, but attains the surface of the eyes towards the vertex, which is considerably raised, occupied by the ocelli; facets rather large, of uniform size; frons both above and below nearest approach of eyes, shining white; occiput, underside of head, and inner orbit of eyes below antennæ white. Antennæ with first two joints black, 3rd reddish brown with blackish marks; style thick. Proboscis short, yellowish, with a few hairs. *Thorax* with dorsum, sides, and scutellum black, uniformly covered with short silvery-grey pubescence; scutellum with four rather large whitish spines. *Abdomen* black, with short silvery-grey pubescence; venter black, with short grey hairs. *Legs* yellowish white; femora black, extreme base and tips pale; tibiæ with a broad black band, leaving only the basal fourth and the tip pale. *Wings* quite colourless, veins distinct, pale; no stigma apparent; squamæ very small, brownish white; halteres brownish yellow, clubs white.

Length, 3 mm.

Described from a perfect ♂ in the Indian Museum, from Calcutta, 22. v. 1907; Rangoon, 18–30. ix. 1914 (*Fletcher*).

Genus **CRASPEDOMETOPON**, *Kert.*

Craspedometopon, Kertész, Ann. Mus. Hung. vii, p. 373 (1909).

GENOTYPE, *Craspedometopon frontale*, Kert.

Head hemispherical; eyes bare, contiguous in ♂ for a considerable distance; upper facets larger than lower, no distinct dividing-line; in ♀, frons $\frac{1}{5}$ of head, sides parallel, bare, shining; a narrow ridge on each side close to eye-margin, continued at vertex around upper corners of eyes and gradually disappearing, continued downwards to some little distance above base of antennæ, meeting a similar transverse ridge; a median ridge in centre of frons, dying away at upper and lower extremities, and an oblong depression with pointed lower end just above antennæ; face retreating; mouth-opening large; occiput slightly concave, shortly pubescent. Proboscis with large labella; palpi 2-jointed, a little shorter than labella; 1st joint rod-shaped, 2nd long elliptical. Antennæ placed on lower part of head, smaller in ♂ than ♀; 1st joint cup-shaped, contracted beyond base; 2nd cup-shaped; 3rd subconical, with seven distinct annulations and a very long terminal pubescent arista. *Thorax* robust, narrower in front than head, broader than head behind, finely punctate; dorsum arched, suture distinct, broadly interrupted in middle; scutellum flush with dorsum, large, arched, hind border truncate, with four strong equidistant spines; sometimes an extra pair, or occasionally five spines asymmetrically placed. *Abdomen* 5-segmented, robust,

broader than long, finely punctate; 1st segment very short, 2nd three times as long as 1st, 3rd rather longer than 2nd, 4th and 5th subequal to 3rd; genitalia small, concealed. *Legs* moderately strong, simple, pubescent. *Wings* normal; costa ending at tip of 3rd vein; axillary vein present.

Range. India, Formosa.

C. frontale is the only known species.

9. **Craspedometopon frontale**, *Kert.* (Pl. I, figs. 5, 6.)

Craspedometopon frontale, Kertész, Ann. Mus. Hung. vii, p. 375, pl. viii, figs. 3, 4, 10 (1909).

♂ ♀ *Head* black, vertex and ocellar bump with yellow hair, which is shorter in ♀; frons in ♂ dull black, with a yellowish-white hair-spot on each side above antennæ contiguous to eye-margin; in ♀ grey, with a median shining black oval depression with its lower end pointed; white hair-spots as in ♂; epistoma with yellowish pubescence; occiput with yellowish tomentum. Antennæ with 1st and 2nd joints chestnut-brown, moderately shining, 3rd darker, with yellow tomentum. Proboscis brownish yellow; 1st joint of palpi yellow, 2nd black. *Thorax* black above, slightly shining; in ♂ the greater part with very short whitish pubescence, anterior margin and sides with short black hair; in ♀ pubescence brassy yellow, thicker; in certain lights can be seen three longitudinal stripes, connected in front, of which the median one reaches the scutellum, outer ones diverging towards side-margins; pleuræ black, more shining, but less punctate and pubescent than dorsum; humeri reddish brown at tips. Scutellum concolorous with thorax, equally pubescent; spines yellowish brown at tips. *Abdomen* black, slightly shining, closely punctate, with similar, but shorter, yellowish-white pubescence. *Legs* brown, pubescence yellow; femora (except tips), upper side of front tibiæ, the middle and hind tibiæ (except bases and tips) almost black; front tarsi with black pubescence on upper side. *Wings* and veins basally, up to middle of discal cell, blackish, remainder yellowish; halteres brownish yellow.

Length, $4\frac{1}{2}$–8 mm.; wings, $4\frac{1}{2}$–8·2 mm.

The above is a free translation of Kertész's description from a large number of specimens from Formosa, iii–v. 1908 (*Sauter*). A ♂ and ♀ named by him are in the Indian Museum; also two ♂♂ from Tenasserim (*Doherty*) and a ♂ from the Darjiling District, 1000–3000 ft., v. 1912 (*Lord Carmichael*).

Genus **TINDA**, *Walk.*

Tinda, Walker, Proc. Linn. Soc. Lond. iv, p. 101 (1860).
Biastes, Walker, Ins. Saund. Dipt. i, p. 80 (1851) [*nec* Panz., 1806].
Phyllophora, Macquart, Mém. Soc. Sci. Lille, 1834, p. 507 (1835).
Etasma, Jaennicke, Abh. Senck. Nat. Ges. vi, p. 322 (1867).

GENOTYPE, *Biastes indica*, Walk. (as *Tinda modifera*); by original designation.

Head more than semicircular, as wide as thorax; eyes bare,

contiguous in ♂ for a long distance; frons moderately broad in ♀, wider at vertex; proboscis and palpi very short. Antennæ elongate, cylindrical, longer than head (in type-species); 1st joint twice as long as 2nd, 3rd three times length of first two together (in *indica*), indistinctly annulated. *Thorax* elliptical, wider behind, rather flattened; scutellum nearly semicircular, with four spines. *Abdomen* elliptical, slightly broader but barely longer than thorax; genitalia inconspicuous. *Legs* short, slender. *Wings* rather narrow, a little longer than abdomen, venation normal.

Range. The Orient and West Africa.

10. **Tinda javana,** *Macq.* (Pl. I, figs. 7, 8.)

Beris javana, Macquart, Dipt. Exot. i, 2, p. 188 (1838).
Tinda javana, de Meij. Tijd. v. Ent. l, p. 232, liv, p. 273.
Biastes indicus, Walker, Ins. Saund. Dipt. i, p. 81, pl. iii, fig. 3 (1851).
Tinda modifera, Walker, Proc. Linn. Soc. Lond. iv, p. 101 (1860).
Phyllophora bispinosa, Thomson, Eug. Resa, Dipt. p. 454 (1869).
Tinda indica, Brunetti, Rec. Ind. Mus. i, p. 92 (1907).

♂ ♀ *Head* with eyes contiguous in ♂ for greater part of distance from vertex to antennæ, leaving a very small vertical triangle wholly occupied by the black ocellar triangle and a few short brown hairs; upper facets much larger than lower ones; frons shining black, nearly wholly occupied by two spots composed of short snow-white pubescence; face whitish grey, the colour spreading more or less along inner lower orbits of eyes; rest of lower part of head black; vertex black, no postocular margin whatever; proboscis yellowish; palpi yellowish, with large spatulate tips. Antennal 1st and 2nd joints yellowish, 1st twice as long as 2nd, cylindrical; 2nd cup-shaped, both with sparse short stiff black hairs; 3rd fully two and a half times as long as 1st and 2nd together, bare, yellowish at base; remainder blackish; only a few basal annulations well defined. In ♀, frons at vertex $\frac{1}{4}$ to $\frac{1}{5}$ width of head, narrowing rapidly to a little above antennæ, where it is less than half as wide, black and slightly shining; postocular margin very broad, bare, slightly shining. *Thorax* black, rather closely punctate, hardly shining, with tomentose yellowish pubescence on dorsum; sides more or less similarly clothed; humeri tipped with brownish orange; a very narrow concolorous ridge thence to wing-base. Scutellum similar to thoracic dorsum; hind margin yellowish, with four rather short yellowish spines. *Abdomen* black, barely shining, closely punctate; venter similar; genitalia small, yellowish, ending in a small cylindrical tube in ♂ and two finger-like lamellæ in ♀ *Legs* all yellow; last tarsal joint brownish. *Wings* grey, anterior margin rather darker; stigma distinct, pale brown; halteres brownish yellow.

Length, $5\frac{1}{2}$–6 mm.

Described from a long series in the Indian Museum and the Pusa Collections: Chapra, Bengal, often in rotting plantain stems, 16. iii. 1917, 29. iii. 1908, 27. iv. 1913 (*Howlett*), 28. v. 1913, 11. v. 1908, v. 1907; Katihar, 8–9. iii. 1909 (*Paiva*); Calcutta, 2. iii. 1907,

12. vi. 1907, 5. vii. 1907, 9. viii. 1907, 26. ix. 1907; Dibrugarh, N.E. Assam, 17–19. xi. 1911 (*Kemp*); Tura, 1200–1500 ft., Assam, vi. 1917 (*Kemp*); Batavia, Java, viii. & x. 1907 (*Jacobson*); Semarang, Java, i. 1906 (*Jacobson*); Andaman Is., 27. iii. 1911 (*Paiva*).

The pupa-case is about 8 mm. long, pale pinkish brown, covered with whitish granulated dust, and 13-segmented; head end very pointed; from 4th segment onward, sides nearly parallel, flattened, last segment the longest, with rounded tip; on upper and lower sides a row of yellow bristles across middle of each segment.

For many years this species has been known as *Tinda indica*, Walk., but de Meijere supports its identity with the *Beris javana* of Macquart described from Java. *B. javana*, Wulp, from Sumatra, is a different species and a true *Beris*.*

Genus **EVAZA**, *Walk.*

Evaza, Walker, Proc. Linn. Soc. Lond. i, p. 109 (1857); Kertész, Ann. Mus. Hung. iv, p. 276; Brunetti, Rec. Ind. Mus. i, p. 97 (1907).
Evasa, Auctores.
Nerua, Walker, *op. cit.* iii, p. 81 (1859).
Nerna, Walker, *op. cit.* iv, p. 97 (1860).

GENOTYPE, *Evaza bipars*, Walk.; by original designation.

Head as broad as thorax; eyes large, contiguous in ♂; upper facets much larger than lower ones; frons narrow in ♀, facets of uniform size. Antennæ short, 1st joint longer than 2nd, 3rd oval, with four annulations, longer than 2nd, with apical arista. Proboscis short, projecting barely beyond mouth-opening; palpi hardly as long as proboscis. *Thorax* elliptical, microscopically pubescent, slightly narrower anteriorly, longer than head, very slightly arched; scutellum semicircular, with four moderate-sized spines. *Abdomen* elliptical, 5-segmented, a little broader and longer than thorax, slightly arched, microscopically pubescent; rather broader in ♀ *Legs* simple. *Wings* with normal venation of subfamily; 3rd vein forked; three veins issuing from discal cell,† and cell closed at some distance from wing-margin.

Range. Only known from the East.

From Kertész's description there are not enough data to include *E. indica* satisfactorily in a table of species. The frons at its narrowest part in the ♀ is one-thirteenth the width of the head. In *E. bipars* it is one-tenth or thereabouts at that part, being about $2\frac{1}{2}$ times wider at vertex. In *E. flavipes* the frons of the ♀ is four times as wide at vertex as at its narrowest part.

Table of Species.

Legs all yellow, at most tips of tarsi brownish.
  Scutellum with only spines yellow ... .. *flavipes*, Big.
  Scutellum with hind margin yellow as well as spines. *bipars*, Walk.
Legs yellow, but with femora and tibiæ darker in part. *indica*, Kert.

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* See Brunetti, Rec. Ind. Mus. i, p. 89 (1907), and de Meijere, Tijd. v. Ent. l, p. 232 (1907).

† The lower one being the upper branch of the 5th vein.

11. Evaza flavipes, *Big.*

Evaza flavipes, Bigot, Ann. Soc. Ent. France, (5) ix, p. 219 (1879); Brunetti, Rec. Ind. Mus. i, p. 98 (1907), vii, p. 451 (1912).

♀ *Head* with eyes only approximate at nearest approach; frons widening to four times as wide at vertex, shining black, bare; ocelli brownish yellow, rather close together on slightly elevated black ocellar triangle; frontal triangle with yellowish-grey pubescence; underside of head and proboscis yellow, with a little yellow pubescence; postocular orbits moderately wide, black, with traces of microscopic golden-yellow pubescence. *Thorax* moderately shining black, with rather dense, very short, yellowish pubescence; sides of thorax and the scutellum similar; latter with four yellowish-brown, rather long spines, which bear a few long yellow hairs. *Abdomen* moderately shining black, microscopically pubescent; genitalia small, telescopic, brownish orange, ending in two cylindrical lamellæ bearing a few pale hairs. *Legs* all orange, microscopically pubescent; tips of tarsi brownish. *Wings* grey, brownish on anterior part, veins dark brown; halteres yellowish.

Length, 7 mm.

Described from a single ♀ in the Pusa collection from Darjiling, viii. 1908 (*Middleton*).

12. Evaza bipars, *Walk.* (Pl. I, fig. 9.)

Evaza bipars, Walker, Proc. Linn. Soc. Lond. i, p. 110, pl. vi, fig. 2 (1857); Brunetti, Rec. Ind. Mus. i. p. 98 (1907).

Evaza flavipes, Wulp (*nec* Bigot, 1879), Term. Füzet. xxi, p. 416 (1898).

♂ ♀. *Head* with eyes contiguous in ♂ for greater part of their length, leaving a very narrow and elongate vertical triangle, shining black; upper and front facets much larger than others; ocellar tubercle very elevated, black; ocelli very distinct, large, reddish; the small frons and lower part of head ash-grey, with a little whitish pubescence; occiput black. Antennæ placed much below middle of head in profile, orange-yellow, arista black; proboscis and the large labella and the palpi orange-yellow. In ♀, frons double as wide (or rather more) at vertex as at point of nearest approach of eyes, at which latter point it is $\frac{1}{10}$ width of head. *Thorax* shining black; suture very distinct; dorsum with very short yellow pubescence, which extends to the scutellum; humeri orange-brown, a yellowish ridge from humeri to wing-base; posterior corners of dorsum rather sharply cut away, orange-brown; pleuræ shining black, sternopleuræ with yellow pubescence. Scutellum black, spines brownish yellow; metanotum shining black. *Abdomen* dull shining black, with short black pubescence; a little yellowish pubescence at sides; genitalia very small, mainly concealed; venter black, shortly pubescent. *Legs* pale yellow, with soft short concolorous pubescence. *Wings* pale

yellowish grey; stigma large, yellow; veins yellowish brown; halteres yellow.

Length, 5–6 mm.

Described from three or four of each sex in the Indian Museum and my own collection; Darjiling, 7000 ft., 12. vi. 1914 (*Gravely*); Lebong, Darjiling District, 13. vi. 1914 (*Gravely*). It occurs also in Papua, Borneo, and Sumatra.

13. **Evaza indica**, *Kert.*

Evaza indica, Kertész, Ann. Mus. Hung. iv, p. 289 (1906).

♂ ♀ *Head* with frontal triangle shining black, except upper part, which is silvery-white tomentose; frons in ♀ shining black, broad above, much narrower below, only one-thirteenth of breadth of head at narrowest part; frons on lower half somewhat impressed at the termination of the fine ridge that starts from the ocellar tubercle; occipital ridge strongly produced; epistome black, with silvery-white tomentum; proboscis and palpi brownish yellow, with concolorous hair; occiput black, with grey hair on lower part. Antennæ brownish yellow; arista black, appearing thick on account of the dense short pubescence—moreover, it is shorter than in any other species, being only a little longer than the antennæ. *Thorax* with nearly parallel sides, dorsum flat, black, finely punctate, with sparse yellowish tomentum-like pubescence, which is a little thicker on posterior half; humeri as well as the narrow ridge up to wing-base brown; pleuræ shining black, pubescence short, rather thick, greyish white. Scutellum black, on a level with thorax, punctate and pubescent like dorsum of thorax, only extreme margin and spines brownish yellow. *Abdomen* only a little longer and broader than thorax, black, finely but closely punctate; dorsum with yellowish brown, depressed, short pubescence; venter with sparser greyish pubescence. *Legs* pale yellow, femora darker towards tips; fore tarsi and last two joints of middle and hind legs blackish brown; pubescence on legs very short, yellowish white. *Wings* slightly brownish; anterior margin of subcostal cell brown up to the wing-tip, but greater part of marginal cell clear.

Length, 6–6½ mm.; wings, 4 mm.

Described from two ♂ ♂ and a ♀ from Bombay, 3. viii. 1902 (*Biró*).

Types in the Budapest Museum.

The foregoing is a translation of Kertész's description.

Genus **PTILOCERA**, *Wied.*

Ptilocera, Wiedemann, Nova Dipt. Gen. p. 7 (1820); Brunetti, Rec. Ind. Mus. i, p. 90 (1907).

GENOTYPE, *Stratiomys quadridentata*, F. (Malay Archipelago); by original designation.

Head semicircular or slightly flattened in front, as broad as thorax; eyes bare, contiguous in ♂ for a considerable distance,

upper facets distinctly larger than lower ones; frons in ♀ moderately broad; proboscis barely protruding from mouth-opening; palpi small. Antennæ very characteristic; in ♂ first two joints short, minutely bristly, 2nd rather shorter than 1st; 3rd with seven annulations, 1st and 2nd annulations short, bare, cylindrical, about the size and length of the first two antennal joints; 3rd annulation in the shape of a two-pronged fork without stem; 4th and 5th annulations similarly shaped but with stems; 6th annulation elongate, much broader at tip than base; 7th annulation somewhat like 6th but shorter and more linear; a long terminal style of about half as long as whole antenna, composed of very dense microscopic feather-like pubescence. In ♀, two basal joints and first two annulations of 3rd joint as in ♂, except that from inner or under side of tip of 2nd annulation emerges a long feather-like ray, the double row of plumes drooping downwards; 3rd annulation very short, cylindrical, much narrower than 2nd, bearing two similar rays; 4th and 5th annulations very elongate, narrow, cylindrical, each bearing two such rays; 6th and 7th very elongate, about as long as 4th and 5th, rather wider towards tips, without rays but microscopically pubescent; style as long as in ♂, but apparently of a sponge-like texture, generally white, with microscopic pubescence. *Thorax* elliptical, broader behind, moderately arched; scutellum nearly as long as broad, more than semicircular, with four distinct subequal spines. *Abdomen* of five segments, not longer than thorax, slightly broader, almost rounded, anterior corners rather angular, rather thick; ♂ genitalia very small, barely projecting; those of the ♀ apparently telescopic, cylindrical, of two pieces and with two small finger-like terminal lamellæ. *Legs* moderately long, slender, without conspicuous pubescence. *Wings* of normal subfamily venation; 3rd vein forked; three discal cell veinlets equidistant, including the upper branch of the 5th vein; anal cell closed at some distance from border; wings folded over abdomen at rest, longer than abdomen.

Range. The Orient and South Africa.

Only one species is definitely known as Indian, *P. fastuosa*, Gerst., though the Indian Museum possesses two specimens in bad condition from the Andaman Islands which Bigot named "*continua*, Walk."; but they cannot be this species and are probably *P. quadridentata*, F., a species easily recognised by the large golden-haired spots with angular inner corners on the anterior margin of the thorax.

14. **Ptilocera fastuosa**, *Gerst.* (Pl. I, figs. 10, 11.)

Ptilocera fastuosa, Gerstaecker, Linn. Ent. xi, p. 332 (1857).
? *Ptilocera smaragdina*, Snellen v. Vollenhoven, Tijd. v. Ent. i, p. 92 (1857).

♀. *Head*: frons one-fourth of head or a little more (nearly 3 mm.), shining black, flush with eyes, very slightly sunken in

middle; sides parallel, except for a very slight contraction about the middle; about the upper half closely punctulate, with minute bristles; these bristles also cover the ocellar triangle, which is elevated above eye-level; ocelli reddish brown; a large dark chestnut-brown shining bare callus above antennæ, not easily distinguishable from the frons, and just above it a grey tomentose spot (seen only in certain lights) on each side, contiguous to inner eye-margin; face with practically parallel sides, as wide as frons, black, with a shining bare spot just below antennæ; a little whitish pubescence, which is rather longer along lower eye-margins. Antennal first two joints shining black, first two annulations of 3rd yellowish-grey tomentose; rays dark shining blackish brown; terminal style yellowish white, sponge-like. Proboscis, palpi, and occiput black, the latter with a little greyish-white pubescence, longer on posterior orbits, especially on lower part. *Thorax* black, very closely punctulate, with minute black spines and with very small scales that exhibit emerald-green and mauve reflections according to the light; these scales, in addition to general distribution, form in good specimens four distinct equidistant longitudinal stripes from anterior to posterior margins, the two outer ones along side-margins of dorsum; the scales also occur below the wing-base, on the mesopleura, and on the scutellum; shoulders rounded, humeri inconspicuous; sternopleura with greyish-white tomentose pubescence; scutellar spines black. *Abdomen* shining indigo-blue or violet, entire surface closely punctulate and covered with minute bristles like the thorax; anterior corners of 2nd segment with a little, very short, whitish pubescence, and a small whitish hair-spot towards upper outer corners of 3rd and 4th segments; 5th segment depressed longitudinally in middle, most of its middle surface with short whitish pubescence, or the hind margin only, or the pubescence in the form of two circles separated by the median depression. Genitalia small, brown, mainly concealed. Venter like upper side, with very minute soft whitish pubescence. *Legs* shining black, with microscopic grey pubescence; a little shining brown about trochanters and base of femora and, perhaps, extreme tips of femora; underside of hind tibiæ with golden-brown pubescence. *Wings* blackish brown; base of 4th posterior cell, greater part of anal and axillary cells, alulæ, and base of wing clear; a yellow streak from costa about stigma, continued hindwards to outer side of discal cell; veins dark brown; halteres black.

Length, 9–10½ mm.

Described from six ♀♀ in the Indian Museum: Darjiling District, 1000–3000 ft., v. 1912; Singla, Darjiling District, vi. 1913; Sukua, base of Darjiling Hills, 500 ft., 1. vii. 1908; Parambikulam, Cochin State, 16–24. ix. 1914 (*Gravely*); Kandy, Ceylon, vii. 1910; Peradeniya, Ceylon, 20. v. 1910; Pollibetta, Coorg, 15–26, v. 1915 (*Fletcher*); Hopin, Upper Burma, viii. 1914 (*Fletcher*); above Tura, Assam, 3900 ft., vii. 1917 (*Kemp*).

I have not seen the male with certainty, and the following notes are from Gerstaecker's description of that sex. Very distinct from ♀, much smaller. *Head* considerably broader than thorax, deep black, with one white hair-spot above antennæ; the latter with 2nd scapal joint and first two annulations of 3rd joint reddish yellow, rest black. *Thorax* with ground-colour dark blackish brown, side-margins and two very indistinct median stripes of emerald-green scales. Scutellar spines, especially middle pair, much longer than in ♀ and mainly reddish yellow. *Abdomen* deep black, with paler sides, white spots as in ♀, but posterior ones absent. *Wings* as in ♀, pale spot on inner border absent.

A ♂ from Coorg, S. India, in the Pusa collection, may be this species: also a ♂ from Pashok, Darjiling, 2000 ft. 11. vi. 1916 (*L. C. Hartless*), though neither of them agrees quite with Gerstaecker's description.

Genus **STRATIOSPHECOMYIA**, *Brun.*

Stratiosphecomyia, Brunetti, Rec. Ind. Mus. ix, p. 261 (1913).

GENOTYPE, *Stratiosphecomyia variegata*, Brun.

Head flattened, semicircular, narrower than greatest width of thorax, nearly bare; occiput not at all projecting behind eyes; ocelli on small, very distinct prominence, equidistant; eyes in ♂ quite contiguous for a moderate distance, hinder and lower facets distinctly smaller than anterior and upper ones. Proboscis thick, apparently moderately long but mainly concealed within the mouth-opening, probably producible; palpi elongate, a little pubescent, apparently of one joint only. Antennæ elongate, nearly filiform, two-thirds as long as head and thorax together; 1st joint about twice as long as broad, 2nd about half this length; flagellum with eight distinct annulations, subequal, except the last which is rather longer and pointed. *Thorax* approximately oval, widest at level of wings, only slightly arched; microscopically pubescent here and there. Scutellum of moderate size, semicircular or subtriangular, unspined. *Abdomen* with a little soft pubescence towards sides at base, apparently 5-segmented, the emargination between the 2nd and 3rd segments extremely indefinite, possibly these forming but a single segment; the 1st very short, transverse, 2nd as wide as 1st at base, thence suddenly narrowing at half its length to cylindrical form, the 3rd at base as wide as tip of 2nd, rapidly widening to tip; the abdomen widening to tip of 4th segment, thence rapidly narrowing, the tip rounded, the 2nd to the 5th segments subequal in length. Genitalia exposed, fairly complex, consisting of a dorsal plate and a pair of two-jointed hairy claspers, with apparently at least one other pair of appendages. *Legs* quite slender, moderately long, minutely pubescent; hind legs longer and slightly stouter, hind femora barely thickened towards tips, hind metatarsi distinctly

incrassated, broader and longer than the remainder of the tarsus; 4th tarsal joint of all the tarsi distinctly shorter than any others. *Wings* well developed, fairly broad, a little longer than abdomen, venation as in *Pachygaster*; halteres large.

15. **Stratiosphecomyia variegata**, *Brun.* (Pl. I, figs. 12, 13.)

Stratiosphecomyia variegata, Brunetti, Rec. Ind. Mus. ix, p. 261 pl. xiv, figs. 14, 17 (1913).

♂ ♀ *Head*: eyes in ♂ contiguous for one-fourth the distance from vertex to antennæ, vertex rather depressed, with conspicuous ocellar prominence, wholly black; frontal triangle brownish yellow, bare, shining, flush with eyes; face lighter brownish yellow, with almost microscopic whitish pubescence and two large circular black spots below base of antennæ; the hinder part of the lower part of the head black; proboscis and palpi brownish yellow, withdrawn, with a little pale pubescence; antennæ cylindrical, nearly filiform, scape brownish yellow, bare, 1st joint twice as long as 2nd; flagellum black, with eight annulations, subequal, except that the last one is a little longer and pointed. In ♀, frons and face greenish yellow, shining, with very short soft whitish pubescence; former at level of antennæ nearly $\frac{1}{5}$ width of head, with parallel sides; a blackish transverse streak from eye to eye a little below vertex, embracing ocellar triangle, the latter shining black, slightly elevated; face rapidly broadening from below antennæ; a thin black ring on face around base of each antenna; a conspicuous round black spot on each side immediately below antennæ; a transverse narrow black band a little lower, from eye to eye; underside of head retreating, greenish yellow, smooth, shining, with whitish pubescence, and two longitudinal blackish-brown marks in each side of mouth-opening; posterior orbit of eyes distinct, but rather narrow, yellow, bare. *Thorax* black, microscopically pubescent, with bright lemon-yellow markings as follows:—On anterior margin of prothorax; the humeral calli; a large triangular mark at each end of the transverse suture, in front of root of wing; a broad band from shoulder to wing-base; the posterior margin of dorsum of thorax broadly yellow, in the form of four contiguous triangles, the outer ones approximate to wing-bases; a large spot placed diagonally on the sternopleura; a curved one between it and the wing-base and lastly one behind the wing, almost contiguous to the metanotum. Sides of thorax with extremely short and rather sparse pubescence, which is black or yellow in accordance with the colour of the surface. *Abdomen* with basal segment reddish brown; 2nd, except perhaps at extreme tip, black; remainder of abdomen reddish brown, with a narrow indistinct transverse blackish streak at base of 4th, and a similarly coloured subquadrate large spot on base of 5th, filling the major part of the segment. *Legs* with coxæ black, tips sometimes a little paler; anterior legs yellowish, tibiæ indistinctly a little darker,

fore tarsi black, except metatarsus, middle metatarsi yellowish white, rest of tarsus brownish yellow. Hind legs brownish yellow, with indistinct traces of brown here and there, base of femora narrowly pale yellow; tibiæ rather flattened at base and slightly pinched beyond the middle, with two indistinct, though fairly obvious, moderately broad, blackish rings, one just beyond base, the 2nd subapical; tarsi brownish yellow, last two or three joints black; the 4th joint in all the tarsi much shorter than any of the others. *Wings* pale grey, gradually darker on apical half, stigmatic region moderately dark brown, ill-defined; halteres large, yellow. Venation as in *Pachygaster*.

Length, 11–12 mm.

Described from five ♂♂, Darjiling, 1000–3000 ft., v. 1912; one ♀ from above Tura, Garo Hills, Assam, 3900 ft., vii. 1917 (*Kemp*); a pair from Shillong, 4900 ft., 31. v. 1918 (*Rao*).

Subfamily CLITELLARIINÆ.*

Head comparatively larger than in PACHYGASTRINÆ; eyes often densely hairy; antennæ variously shaped; 3rd joint annulated, elongate (*Lasiopa*), conical (*Clitellaria*), or somewhat clubbed or oval (*Oxycera*, *Nemotelus*). *Thorax* stout, subquadrate or widened in the middle, occasionally with a strong spine on each side (*Ephippium*, *Negritomyia*); scutellum spined or not. *Abdomen* about as long as thorax, 5- or 6-segmented, varied in form, generally subquadrate or oblong. *Legs* moderately long and strong, with soft pubescence or bare. *Wings* with 2nd vein often apparently anastomosed with 3rd; 4th vein with three terminations; 5th vein forming hinder side of discal cell, therefore posterior cross-vein absent. In some cases the 5th vein touches the discal cell for so short a space that the connection almost appears as the posterior cross-vein;† 5 posterior cells, all united on wing-margin.

This subfamily is characterised by the absence of the posterior cross-vein, therefore the discal cell apparently emits four veins. The normal absence of an antennal arista and apparent union of the 2nd vein with the 3rd are also good characters. The species are moderately or rather densely pubescent, or quite bare.

Life-history. Larva, in addition to the eleven body-segments, with an apical tip at the posterior end, bearing a few bristles instead of a fringe of hairs. The metamorphoses of some European species of *Oxycera* are well known, the larvæ living in mud or water; and that of *Ephippium* also, it being parasitic in nests of *Formica fuliginosa*.

* For table of Oriental genera, *vide* Brunetti, Rec. Ind. Mus. i, p. 113; for HERMETIINÆ, id. *l. c.* p. 120 (1907).

† According to Verrall, in such cases the species are regarded as belonging to the CLITELLARIINÆ. The presence of the posterior cross-vein would place them in the STRATIOMYINÆ, this character being the only structural dividing-line between them. It would perhaps be better to unite both groups under STRATIOMYINÆ.

The HERMETIINÆ have by some authors been separated from the CLITELLARIINÆ proper, but it seems better to retain them under one subfamily.

Table of Genera.

1.	Thorax with a strong side-spine	2.
	Thorax without such spine	3.
2	Antennal style bare	EPHIPPIUM, Latr., p. 45.
	Antennal style thickly pilose, conspicuous.	NEGRITOMYIA, Big., [p. 47.
3.	Scutellum 2-spined .	4.
	Scutellum unspined.	6.
4.	Antennal 3rd joint very long, filiform ..	AMPSALIS, Walk., p. 44.
	Antennal 3rd joint elongate or conical, not filiform	5.
5.	Third antennal joint with distinct style	CLITELLARIA, Mg., [p. 49.
	Third antennal joint with arista ..	OXYCERA, Mg., p. 53.
6.	Abdomen globose, much broader than thorax	RUBA, Walk., p. 48.
	Abdomen elliptical or linear	7.
7.	Antennæ not longer than head; 3rd joint conical	LASIOPA, Brullé, p. 52.
	Antennæ longer than head; 3rd joint very elongate or nearly filiform..	8.
8.	Abdomen linear, considerably longer than thorax; antennæ cylindrical or rather flattened	HERMETIA, Latr., p. 39.
	Abdomen elliptical, barely longer than thorax; antennæ cylindrical, subfiliform	EUDMETA, Wied., p. 41.

Genus **HERMETIA**, *Latr.*

Hermetia, Latreille, Hist. Crust. Ins. xiv, p. 338 (1805); Brunetti, Rec. Ind. Mus. i, p. 121 (1907).
Thorasena, Macquart, Dipt. Exot. i, pt. 1, p. 177 (1838).

GENOTYPE, *Musca illucens*, L. (Tropical America); by original designation.

Head transverse, distinctly wider than thorax; eyes microscopically pubescent; frons broad in both sexes. Antennæ with 1st and 2nd joints cylindrical, 2nd half as long as 1st; 3rd very elongate, cylindrical, 5-annulated, with an about equally long, densely pubescent style, shaped like an elongated club. Proboscis rather short, with large prominent labella; palpi short, cylindrical. *Thorax* subquadrate, moderately arched; scutellum semicircular, unspined. *Abdomen* linear, arched above, considerably larger than thorax, 5-segmented in ♂, 6 or 7 in ♀ Genitalia in ♂ characteristic, attached to ventral side of 5th segment, consisting of a piece broadened at base, pointed at tip, apparently membranous, bearing on each side a two-jointed palp-like organ, also membranous; two horny oval valves, probably for enclosing the

membranous organs, and bearing a spine on the underside. In the ♀ the 6th and 7th segments are narrow, telescopic and withdrawable into the 5th; genitalia consisting of a triangular bifid piece, with a small filamentous two-jointed appendage on each side. *Legs* moderately long, slender, simple. *Wings* with normal venation of subfamily.

Range. India and the East; North, South, and Central America; Africa.

16. **Hermetia læta**, *Meij.* (Pl. I, figs. 20, 21.)

Hermetia læta, de Meijere, Bijd. tot Dierk. xviii, p. 93, pl. viii, fig. 8 (1904); Brunetti, Rec. Ind. Mus. i, p. 122 (1907).
Hermetia cerioides, Brunetti, *l. c.*

♂ ♀ *Head* yellow; a blackish cross-band above middle; on each side contiguous to eyes a blackish triangular spot above level of antennæ; vertex more or less blackish; occiput black; antennal 1st and 2nd joints brownish yellow, 3rd blackish. *Thorax* black, slightly shining; an indistinct whitish median line on anterior part, only reaching to suture;* humeri, a contiguous triangular spot on each side of anterior margin; a short contiguous or subcontiguous side-stripe from humeri, reaching suture and thereat slightly upturned, posterior calli and scutellum, all bright yellow; latter sometimes narrowly black at base. On sides of thorax a horizontal oval yellow spot between 1st and 2nd pairs of coxæ, and a vertical oval one just in front of it, reaching wing-base. *Abdomen* with first three segments mainly black, remainder reddish brown; a pair of large, approximately oval, yellow spots near each other, placed longitudinally on anterior margin of 2nd segment (the spots much smaller in ♀), with a small spot at each side on extremity of hind margin; 3rd and 4th segments with distinct yellow hind margin; 5th with an elongate triangular spot at tip, which in ♀ is narrower and longer, nearly reaching anterior margin; sides of abdomen yellow down to about end of 3rd segment. Venter with basal three segments mainly black, 2nd a little pellucid at sides and tip, remainder reddish brown; hind margins of 3rd and 4th segments narrowly yellow. *Legs* yellow; femora blackish brown, narrowly pale at tips, more broadly so on front pair; tips of tibiæ a little darker, tarsi yellowish white. In one specimen the basal half of all the femora is pale. *Wings* yellowish grey, veins pale brownish yellow; halteres yellowish.

Length, 8–12 mm.

Described from two ♂♂ and eight ♀♀ in the Indian Museum in bad condition, probably the same set from which de Mejiere compiled the original description, as he records the species as "bred from a betel-nut palm in Backergunge, Bengal; in Indian Museum, 2♂♂, 3♀♀."

* I do not perceive this.

These insects bear no history and were named "*cerioides*, Walk." (I do not know by whom); and from the set I selected one as *læta*, Meij., and recorded it in my first paper on STRATIOMYIDÆ, referring the remaining specimens to *cerioides*, Walk. A closer examination reveals them all to be *læta*, as they agree with the description exactly.*

Osten-Sacken notes that fresh specimens of *cerioides*, Walk., have green (as recorded by Walker) instead of the yellow spots in dried ones, but this change after death is frequent in this family. *H. cerioides*, Walk., differs by the legs being (presumably) black, with lurid knees and white tarsi, by its blackish-brown wings, and the absence of the single spot on the 5th abdominal segment.

Genus **EUDMETA**, *Wied.*

Eudmeta, Wiedemann, Auss. Zweifl. ii, p. 43 (1830).
Toxocera, Macquart, Dipt. Exot. Supp. iv, p. 44 (1849).

GENOTYPE, *Hermetia marginata*, F.; by original designation.

Head about as broad as widest part of thorax, rather more than semicircular; eyes very large, bare, contiguous in ♂ for a considerable distance; upper facets larger than lower in ♂, of uniform size in ♀ Antennæ inserted below middle line of head; 1st and 2nd joints subequal, normal, short; 3rd longer than head, cylindrical, of eight indistinct annulations. Proboscis short; palpi small, cylindrical. *Thorax* rather elongate, oval in front, broader behind, moderately arched; scutellum subtriangular, rounded at tip, unspined. *Abdomen* elliptical, comparatively broad at base, as long as or a little longer than thorax, flattened, depressed towards tip; genitalia in ♂ distinct, small. *Legs* moderately long, thin, simple; tarsi long. *Wings* with normal venation; discal cell triangular.

Range. The Orient.

Wiedemann describes the antennæ as 5-jointed and Macquart follows suit, both illustrating these organs; but it seems only a question of the distinctness or otherwise of the annulations of the 3rd joint, which is not infrequently an individual matter, some specimens showing them clearly and others very indistinctly. The same occurs in many individuals and species in this family.

Table of Species.

Shorter, brownish-yellow species; abdomen distinctly broader than thorax; 3rd antennal joint as long as half width of head	*flavida*, Brun.
Elongate blackish-brown species, abdomen no broader than thorax; 3rd antennal joint nearly as long as width of head.	
Abdominal side-margins green (in life, yellow in dried specimens)	*marginata*, F.
Abdomen without differently coloured side-margins.	*brunnea*, Meij.

* Mr. Bainbrigge Fletcher bred it from larvæ found in rotting stems of a betel-nut tree at Karimganj, vii. 1918.

17. Eudmeta marginata, *F.* (Pl. I, fig. 17.)

Hermetia marginata, Fabricius, Syst. Antl. p. 63 (1805).
Eudmeta marginata, Wiedemann, Auss. Zweifl. ii, p. 43, pl. ix, fig. 4 (1830); Macquart, Dipt. Exot. Supp. iii, p. 16, pl. i, fig. 9 (1848); Brunetti, Rec. Ind. Mus. i, p. 123 (1907); de Meijere, Tijd. v. Ent. liv, p. 262 (1911); Kertész, Ann. Mus. Hung. vii, p. 388 (1909).
Hermetia cingularis, Guérin, Voy. Coq., Zool. ii, 2, p. 290 (1830).
Hermetia singularis, Guérin, Icon. Règn. An. vii, p. 543, pl. 98, fig. 1 (1835).
Toxocera limbiventris, Macquart, Dipt. Exot. Supp. iv, p. 45, pl. v, fig. 3 (1849).

♂ ♀ *Head*: eyes in ♂ contiguous for a considerable distance, leaving a moderate-sized vertical triangle and small frontal triangle; upper facets very much larger than lower; vertical triangle wholly occupied by ocellar tubercle and brownish ocelli; a few brownish or greyish hairs; frontal triangle very small, shining dark brown; face dull brownish grey, with white pubescence, two small contiguous pale spots with a small orange longitudinal streak below them, immediately below base of antennæ; the latter orange-brown, 3rd joint with eight annulations, darker towards tips; underside of head blackish, with white pubescence; proboscis dark, with very large, brownish orange labella; occiput black, with whitish microscopic pubescence on upper part, a little longer on lower part. In ♀, frons moderately narrow, $\frac{1}{7}$ or $\frac{1}{8}$ of head, sides nearly parallel, brownish orange, nearly bare. *Thorax* rather dull black, with short brownish pubescence on dorsum, more whitish and sparser at sides; a small callus on shoulder, joined to an elongate stripe on lower margin of dorsum ending at suture; hind corners of dorsum with a similar callus, contiguous to an elongate one immediately below, placed vertically; a moderate-sized oval spot on sternopleura and a subtriangular one just in front of wing-base; all these spots orange or yellowish (possibly apple-green in life), and slightly variable in shape and extent; scutellum black, with a moderate-sized rounded pale yellow spot at tip. *Abdomen* dark bluish black, microscopically pubescent, slightly shining; extreme side-margins orange-yellow (green in life); vertex blackish. *Legs* all dark brown or blackish; a little soft pubescence behind, at least, front femora. *Wings* grey; a rather brown streak across the middle from the small brown stigma to anal cell; a large apical brown suffusion beginning distinctly beyond discal cell; halteres brownish yellow.

Length, 11–13 mm.

Described from five ♂♂ and one ♀ in the Indian Museum from Darjiling, 1000–3000 ft., vi. 1912; Pyinmana, Burma, vi. 1910 (*H. L. Andrewes*). The ♀ bears no locality. The specimens appear to have been in spirit and are consequently unreliable for descriptive purposes, especially in the matter of pubescence; but they are undeniably *E. marginata*. The species occurs in Singapore, Java, Borneo, Amboina, and North-east Sumatra.

18. **Eudmeta brunnea,** *Meij.*

Eudmeta brunnea, de Meijere, Bijd. tot Dierk. xviii, p. 94, pl. viii, fig. 10 (1904).

♂ ♀ *Head* with frons at level of antennæ, one-fourth of head, a little narrower at vertex and a little wider at lowest part of face; yellowish brown; antennæ blackish brown. *Thorax* yellowish brown, sides a little darker. *Abdomen* yellowish brown, 2nd segment in middle with two blackish-brown longitudinal stripes near side-margins; 4th and 5th segments with hind borders blended together so that the whole surface is blackish brown, except that in the 4th is a triangular middle spot of the ground-colour; anterior border of this segment narrowly yellow; venter yellowish brown, tip darker. Abdomen in ♀ lighter in middle. *Legs*: anterior tarsi darker at tip; hind tibiæ and tarsi black; rest of legs yellowish brown; hind metatarsi in ♀ as long as tibiæ, whereas they are shorter in the ♂ *Wings* rather dark, more yellowish on anterior border; tip and a band across the middle blackish brown, more or less connected with a dark patch in anal cell; halteres brown.

Length, 14 mm.

Described mainly from a specimen in the Indian Museum from Kohima, Assam, augmented by de Meijere's description of a ♂ and 2 ♀ ♀ from Darjiling.

The only discrepancy is the fact that the thoracic dorsum is darker than the sides instead of *vice versa*; also the dorsum of the abdomen is mainly blackish brown, except towards sides on anterior half, where it is lighter brown.

19. **Eudmeta flavida,** *Brun.*

Eudmeta flavida, Brunetti, Rec. Ind. Mus. vii, p. 454 (1912).

♂ *Head* with eyes contiguous for two-thirds the distance from the very small vertex to the frons; upper facets rich red-brown, much larger than the lower ones, which are nearly black; ocellar triangle small, black, slightly elevated, with a few hairs, lower margin of eyes white; frons and face smooth, bare, livid yellow. Mouth and proboscis brown; palpi small, black, oval at tip. Antennæ yellow, almost bare, except a few hairs at tips of the first two joints, which are very short; 3rd joint elongate, with a little greyish shimmer towards the rather narrowed tip, ending in a distinct, moderately long, black, cylindrical style, which is 3-jointed and very closely black pubescent, the first two joints very short. Occiput not projecting beyond hinder margin of eyes, much invaginated in the middle; yellowish, with very short hairs. *Thorax* rather dull brownish yellow; sides, scutellum, and metanotum concolorous, except that the scutellum is rather reddish. Whole dorsum, sides, and scutellum covered with soft, dense, pale yellow hair. *Abdomen* rather shorter and more globose than *E. brunnea,* Meij.; ferruginous brown, blackish on the edges and

towards tip; whole surface with close, short, yellow pubescence. Venter similar, pubescence very short. *Legs* brownish yellow, a dark brown ring on apical half of hind tibiæ; tarsi tips black. The legs are minutely yellow pubescent, the colour brightest on the tarsi. *Wings* pale yellow, veins brownish; a stigma-like oval black spot towards tip of upper basal cell; the end of the wing mainly occupied by a brown suffusion which dies away towards posterior margin; halteres yellow.

Length, 8 mm.

Described from a single ♂ in good condition in the Indian Museum collection from Margherita, Assam.

The abdomen is much shorter and more rounded than in *E. marginata*, which makes me doubtful whether it is well placed in *Eudmeta*.

Genus **AMPSALIS**, *Walk.*

Ampsalis, Walker, Proc. Linn. Soc. Lond. iv, p. 98 (1860).

GENOTYPE, *Ampsalis geniata*, Walk. (Celebes); by original designation.

"Body elongate, nearly linear. Head a little broader than the thorax; eyes prominent; palpi very short. Antennæ filiform, much longer than the breadth of the head; flagellum linear, about twice the length of the scape; joints indistinct. Thorax elongate elliptical; scutellum armed with two obliquely ascending spines. Abdomen elliptical, a little broader but not longer than the thorax. Legs rather long. Wings narrow, 1st cubital vein about one-fourth the length of the 2nd,* four externo-medial veins complete;† subanal vein curved, joining the anal vein at some distance from the border; discal areolet elongated and attenuated exteriorly, exterior side very short."

Range. The only other species than *A. longispinus* comes from Celebes.

20. **Ampsalis longispinus**, *Brun.* (Pl. I, figs. 18, 19.)

Ampsalis longispinus, Brunetti, Rec. Ind. Mus. ix, p. 264, pl. xiv, figs. 2, 4, 16 (1913).

♂ ♀. *Head* twice as broad as long; eyes in ♂ contiguous for greater part of distance from vertex to antennæ; frons shining black in ♂, one-fourth to one-fifth width of head in ♀, less shining, bare; ocelli on distinct prominence, yellowish; occiput black, minutely pubescent. Antennæ black, 1st and 2nd joints subequal, cylindrical, barely broader at the narrowly brown tips, minutely spinose; 3rd joint cylindrical, almost filiform, pointed, with eight annulations. *Thorax* dull black, with microscopic pubescence, which in perfect examples is probably blackish or dark

* 2nd and 3rd longitudinal veins respectively.
† 4th longitudinal vein-endings.

grey; traces of a little brownish colour behind the wings; hind corners of dorsum distinctly so coloured. Scutellum of normal size, shining æneous or blue-black, with soft (? pale) hairs and two very long, powerful, conspicuous, reddish-brown apical spines half as long as the abdomen, diverging and directed slightly upwards. *Abdomen* brownish yellow; 1st and 2nd segments mainly black, hind border of latter brownish yellow, 3rd and 4th each with a rounded or subquadrate blackish spot of considerable size towards each side but clear of the margins; these four spots in the ♀ nearly filling the surface of these segments; 5th and 6th segments in both sexes mainly black, but sides and hind margins brownish yellow. Venter with 1st, 2nd, 4th, and 5th segments mainly black, remainder brownish yellow; the black colour a little more extended in ♂; whole surface of venter in both sexes with very short yellowish pubescence. Genitalia in ♂ concealed; in ♀ a narrow cylindrical tube, with a pair of rather long brownish-yellow hairy filamentous appendages. *Legs* yellow; hind tibiæ incrassated on apical two-thirds, black; hind tarsi longer than tibiæ, the hind metatarsus black for two-thirds of its length and as long as the remaining joints taken together. *Wings* distinctly yellowish, very shining, apical third and hind margin grey; stigma black or blackish brown, veins blackish; halteres yellow.

Length, 10–13 mm.

Described from three ♂♂ and four ♀♀ from Darjiling, 1000–3000 ft., v–vi. 1912, and Singla, iv. 1913, in fair condition; Shillong, 4900 ft., 31. v. 1918 (*Rao*); 5000 ft., vi–vii. 1918 (*Fletcher*).

There is nothing material to prevent this species from coming in *Ampsalis*. The head is barely as wide as the thorax at its widest part, and Walker says the scutellum is armed with two oblique ascending spines, but does not mention their great length. The only apparent discrepancy is that he says the flagellum is about twice the length of the scape, whereas in the present species it is fully three times as long, but this difference would not be generic.

Genus **EPHIPPIUM**, *Latr.*

Ephippium, Latreille, Gen. Crust. Ins. iii, p. 448 (1802-3), and xiv, p. 341 (1804).

Ephippiomyia, Bezzi, Zeits. Hym. Dipt. ii, p. 191 (1902); Brunetti, Rec. Ind. Mus. i, p. 115 (1907).

GENOTYPE, *Stratiomys ephippium*, L. (Europe); by original designation.*

Head comparatively small, as wide as front part of thorax; face arched, not projecting in profile, densely pubescent; palpi long and thickly pubescent; eyes densely hairy in both sexes, in ♂

* [Latreille did not actually designate a genotype; in vol. iii he mentions two species as belonging to his genus, viz., *microleon*, L., and *ephippium*, L.; in vol. xiv he gives the same two species in reverse order.—ED.]

contiguous for a considerable distance, facets of equal size; in ♀, frons broad. Antennæ as long as broad, 1st and 2nd joints subequal, 3rd elongate; indistinctly annulated, with long pointed bare apical style. *Thorax* a little longer than broad, narrower in front, with a conspicuous spine on each side, just before the base; humeri elevated; scutellum higher at base than hind part of thorax; with two long thick hairy spines. *Abdomen* ovate, flattened, a little longer and broader than thorax and scutellum together. *Legs* strong, moderately long; front coxæ large. *Wings* strongly rippled, but not ribbed; traces of posterior cross-vein, as upper branch of 5th vein is in almost punctiform contact with discal cell; discal cell-veinlets distinct; alulæ unusually large; alar squamæ absent, thoracic pair small.

Range. Europe, Japan, South Asia.

Life-history. That of the European *E. thoracicum*, Panz., is known; a conspicuous but hardly a common species. The larvæ are parasitic in nests of the ant, *Formica fuliginosa*. Roser records finding one in a rotten nut-tree, and thinks they must take about four years to reach maturity.

The alleged preoccupation of *Ephippium* by Bolten in Mollusca, on which Bezzi suggested *Ephippiomyia*, is very doubtful, according to Verrall, and the original name is of too old standing to be altered.

21. **Ephippium bilineatum**, *F.* (Pl. I, figs. 15, 16.)

Stratiomys bilineata, Fabricius, Syst. Antl. p. 79 (1805).
Clitellaria bivittata, Wiedemann, Zool. Mag. i, p. 3 (1819); Auss. Zweifl. ii, p. 46 (1830).
Ephippium angustum, Macquart, Hist. Nat. Dipt. i, p. 252 (1834).
Rhaphiocera spinithorax, Macquart, Dipt. Exot. Supp. iii, p. 17, pl. i, fig. 7 (1848).
Clitellaria tenebrica, Walker, List Dipt. Brit. Mus. iii, p. 522 (1849).
Ephippium spinigerum, Doleschall, Nat. Tijd. Ned. Ind. x, p. 407, pl. ix, fig. 2 (1856).
Negritomyia bilineata, Wulp, Notes Leyd. Mus. vii, p. 95 (1885).
Ephippiomyia bilineatum, Brunetti, Rec. Ind. Mus. i, p. 115 (1907).

♂ ♀. *Head*: eyes of ♂ with rather dense brown pubescence, contiguous for about the same distance as from lowest point of contact to base of antennæ; vertical triangle rather small, with blackish-brown hairs; frons and face black, with dense, white or whitish, rather long pubescence; occiput black, margin with minute snow-white pubescence, which nearly disappears at the sides and becomes longer on lower part; proboscis with very large dark brown labella; palpi blackish, pubescent. Antennæ with first two joints black, bristly; 3rd to extreme tip of style about one and a half times as long as 1st and 2nd together, dull brown, elongate, conical, with three distinct broad annulations, bare, after which it narrows abruptly and bears some distinct hairs and is produced into a very narrow terminal style. In ♀, frons about one-twelfth

width of head, sides parallel, shining black, with a small patch of white pubescence in middle. *Thorax* shining black or blue-black, closely punctulate; dorsum with blackish-brown pubescence and two moderately wide well-separated stripes from anterior margin to hind margin, or even indistinctly carried over part of the scutellum, composed of very short whitish-grey pubescence; humeri rather prominent, shining bright brown, bare; sides of thorax shining black, mainly covered with longer or shorter whitish-grey pubescence. Scutellum concolorous with dorsum, hind margin with a little grey pubescence; the spine at each hind corner strong, long, black, and pubescent. *Abdomen* shining black or blue-black, closely punctulate, with dark brown pubescence on dorsum and longer whitish-grey pubescence at sides and on the concolorous venter; a tendency to form a hair-spot towards sides of each segment, especially on 3rd and 4th; underside of last segment bare, shining. *Legs* black, shortly grey pubescent; tips of tarsi brown below. *Wings* with base narrowly, costal cell, base of 1st basal cell and the axillary cell, clear; rest of wing dark brown, a little paler on hind margin; 5th vein rather more deeply infuscated; halteres pale yellow.

Length, 9–14 mm.

Described from several specimens in the Indian Museum: Tenasserim (*Doherty*); Semarang, Java, viii. 1909, and Depok, Java, x. 1907 (*Jacobson*).

Genus **NEGRITOMYIA**, *Big.*

Nigritomyia, Bigot, Bull. Soc. Ent. France, (5) vii, p. lxxiv (1877).
Negritomyia, Bigot, Ann. Soc. Ent. France, (5) ix, p. 190 (1879).

GENOTYPE, *Ephippium maculipenne*, Macq.; by original designation.

Antennæ nearly cylindrical, base a little pubescent, 1st and 2nd segments subequal, 1st much shorter than 3rd, arista apical, about as long as the whole antenna, densely, shortly, and uniformly pubescent. Eyes contiguous in ♂, distinctly apart in ♀, densely pubescent in both sexes. Thorax with a long spine on each side; scutellum with two long spines. Wings with four endings to the 4th longitudinal vein, all reaching the border.

Range. Africa, Ceylon, Malay Archipelago, Australia.

22. **Negritomyia maculipennis**, *Macq.*

Ephippium maculipenne, Macquart, Dipt. Exot. Supp. iv, p. 54 (1849), ♂.
Negritomyia maculipennis, Brunetti, Rec. Ind. Mus. i, p. 114 (1907), & vii, p. 451 (1912).

♀ *Head* black, with a little short whitish pubescence; eyes black, shortly pubescent; frons at vertex about one-fifth the width of the head, widening at level of antennæ to nearly one-third; an indistinct whitish mark above each antenna; palpi black, with

short yellow pubescence; back of head black; posterior orbit of eyes with narrow silvery-white pubescence. Antennæ blackish, inner side of 3rd joint pale; style closely pubescent. *Thorax* black, moderately shining, with very short black hairs; covered with microscopic grey hairs, except along a broad median line and on two large spaces towards each side of the dorsum, *i. e.*, one behind the shoulder and above each wing; sides of thorax shining black, with microscopic grey pubescence below shoulders and some short snow-white hairs above the fore coxæ; there is also a rather wide perpendicular side-stripe of similar pubescence above the middle coxæ, joining the dorsal pubescence in front of the wing; side-spines short, strong, black. Scutellum black, with short black hairs and concolorous grey pubescence, and two broadly separated, strong, short, black spines on hind margin. *Abdomen* black, with grey pubescence forming a broad dorsal line on hinder half and a subtriangular spot towards each side of each segment. Venter shining black, practically bare. *Legs* black, with very minute whitish pubescence; basal fifth of anterior femora and basal fourth of hind pair, also major portion (from the base) of all the tarsi, pale yellowish white. *Wings* subhyaline; stigma dark brown, roughly oval, very distinct; tip of wing from outer side of discal cell, thence in a straight line to the costa and extending hindwards, until filling the 2nd posterior cell, distinctly brown, the colour filtering more or less into the 3rd posterior cell; halteres with stem yellow, clubs dark brown.

Length, 11 mm.

Redescribed from a single perfect ♀ in my collection from Kandy, Ceylon, viii. 1908 (*Green*); Pollibetta, Coorg, x–xi. 1915 (*Fletcher*). Loew's *maculipennis* (1856) from South Africa is a different species.

Genus **RUBA**, *Walk.*

Ruba, Walker, Proc. Linn. Soc. Lond. iv, p. 100 (1860).

GENOTYPE, *Ruba inflata*, Walk.; by original designation.

Body thick and broad; head much narrower than thorax; proboscis and palpi very short. Antennæ nearly as long as breadth of head; "3rd joint broader and longer than the flagellum, of which the joints are short, compact, and minutely setulose".* Thorax a little longer than broad, scutellum unarmed; abdomen globose, very much broader and a little longer than thorax. Legs short. Wings moderately broad; "1st cubital vein not one-third of length of 2nd; four complete externo-medial veins; subanal vein curved, joining the anal vein at some distance from the border; discal areolet elongated exteriorly, irregularly triangular, exterior side very short."

Range, India, Celebes, Papua.

* Walker's "flagellum" is the style.

23. Ruba inflata, *Walk.*

Ruba inflata, Walker, Proc. Linn. Soc. Lond. iv, p. 101 (1860).

♀ *Head*: frons and face one-third of head, uniformly wide except for a slight contraction slightly above base of antennæ; ocellar triangle very small, black; an oval brown longitudinal mark on frons just above the orange antennæ, of irregular shape, continued as a fine line to the ocellar triangle; whole head brownish orange; proboscis with very large labella; tips of palpi rounded, flattened, rather large, deep black;* whole head with rather short, moderately dense, but not conspicuous, yellow pubescence. *Thorax* and scutellum all brownish orange, with rather dense yellow pubescence; traces of three longitudinal narrow blackish lines on dorsum. *Abdomen* brownish orange, with yellow pubescence. *Legs* yellowish orange, with yellow pubescence; apical half of hind tibiæ black, with black pubescence; the tiny bristles at the tips of the tarsi give them a blackish appearance. *Wings* pale yellow, apical half (except extreme tip) rather bright brown, darker anteriorly; a quadrate dark brown spot of moderate size at tip of 1st basal cell, extending to the costa; anterior margin of basal half of wing a little deeper yellow.

Length, 9 mm.

Described from a perfect female in the Indian Museum from Ghumti, Darjiling District, 1000 ft., vii. 1911 (*Gravely*); and one in inferior condition from Kohima, Assam.

Walker described the species from Makassar, in Celebes, and the only descrepancy is that he says nothing about the black apical half of the hind tibiæ.

Genus **CLITELLARIA**, *Mg.*

Clitellaria, Meigen, Illig. Mag. ii, p. 265 (1803).
Adoxomyia, Kertész, Ann. Mus. Hung. v, p. 499 (1907); *nom. nov.* for *Clitellaria*, Sch., *nec* Mg.

GENOTYPE, *Clitellaria dahlii*, Mg. (Europe); designated by Bezzi, Wien. ent. Zeit. xvii, p. 75 (1908). †

Head: eyes densely pubescent, contiguous in male, wide apart in female; proboscis retracted, with moderately broad labella; palpi 2-jointed, 1st joint thick, kidney-shaped, 2nd narrow, conical; epistoma slightly arched. Antennæ elongate, 1st and 2nd joints subequal; 3rd elongate conical, with four annulations, with two-

* The palpi lie along the lower side of the face and the conspicuous black tips look like two black spots on it, Walker evidently mistaking them for such as he mentions "a black spot on each side of the mouth."

† [It seems necessary to point out that this designation is entirely at variance with the generally accepted rules of zoological nomenclature. Meigen, when describing *Clitellaria*, definitely designated *ephippium*, F., as the genotype, and no subsequent action on the part of Meigen himself or anyone else can alter that fact. The correct designation for the present genus is therefore *Adoxomyia*, Kert., and the species described above (p. 46) as *Ephippium bilineatum* should stand as *Clitellaria bilineata*, F.—ED.]

jointed apical style, 1st very short, 2nd long. *Thorax* elliptical, moderately arched; scutellum with two spines, often small and indistinct. *Abdomen* a little broader than thorax, oval or elliptical, rather well arched, 5-jointed; genitalia small. *Legs* moderately long and strong. *Wings* with normal venation; 3rd vein distinctly forked, 4th vein with three endings; posterior cross-vein absent, as upper branch of 5th vein forms part of lower side of discal cell.

Range. Europe, Western Asia, North Africa, Orient, North America.

Life-history. That of the common Indian *C. heminopla*, Wied., has been worked out at the Pusa Institute.

Some confusion has arisen over the name *Clitellaria*. Verrall notes that it was established by Meigen in 1803 for *ephippium*, F., and that that author subsequently (1822) enlarged the scope of the genus, including in it *villosa*, F., *calva*, Mg., and *pacifica*, Hfg., as well as *ephippium*, F. Latreille in 1804 erected *Ephippium* for the species of that name,* and, as was customary in those days in such cases, changed the specific name to *thoracicum* to avoid redundancy. Therefore the name *Clitellaria* must stand for the remainder of the species placed in it by Meigen or, at the very least, for one of them. *C. pacifica* is an *Odontomyia* and synonymous with *limbata*, Wied., which leaves only *villosa* and *calva*, one of which should be the type of *Clitellaria*, Mg. Kertész retains Meigen's original sense of the genus (*i. e.*, for *ephippium*, F.) in his Kat. Dipt. (1908), but adopts the inadmissible name *Potamida* (Mg. 1800) for it. Meigen added *dahlii* in 1830 to *Clitellaria* and Kertész has renamed this group of species *Adoxomyia*. *Lasiopa*, Brullé (1832), differs from *Clitellaria*, Mg., in having an unspined scutellum, and both *villosa* and *calva* have been placed in it Therefore *Clitellaria*, as understood by Meigen, was by this time reduced to the single species *dahlii*, and this species is designated by Bezzi as the genotype. Kertész's "*Potamida*, Mg." must continue to be known as *Ephippium*, Latr.; *Adoxomyia*, Kert., is the true *Clitellaria*, Mg., and must retain this latter name; and *Lasiopa*, Brullé, is a good genus.

The two Indian species are separated thus:—

Thorax without definite hair-stripes, but with a darker median stripe surrounded by four spots arranged in a square	*heminopla*, Wied.
Thorax with two distinct stripes of short golden-brown hairs	*bistriata*, Brun.

24. **Clitellaria heminopla**, *Wied.* (Pl. I, fig. 14.)

Clitellaria heminopla, Wiedemann, Zool. Mag. iii, p. 30 (1819); id., Auss. Zweifl. ii, p. 48 (1830); Brunetti, Rec. Ind. Mus. i, p. 120 (1907).

♂ ♀ *Head*: eyes in ♂ practically contiguous for about half the distance from vertex to frontal triangle; black, upper facets

* [This is not strictly accurate (see footnote on p. 45).—Ed.]

barely larger than lower ones, not clearly demarcated, with moderately short dense pubescence, which appears grey or brown according to the point of view; vertex black, with a few long whitish hairs; ocelli reddish; frontal triangle black, with rather long soft whitish hair; face and lower part of head black, with greyish-white pubescence; proboscis dull yellowish; palpi reddish brown; antennal 1st and 2nd joints black, 3rd joint reddish brown to yellowish, first four annulations much broader and more distinct than the rest, which form a narrow blackish cylindrical tip; a reddish-brown ring round base of antennal prominence. In ♀, frons forming $\frac{1}{4}$ to $\frac{1}{5}$ width of head, a little narrower at vertex, with short whitish-grey or brownish-grey pubescence; lower part of frons shining, practically bare, except for a bunch of drooping whitish hairs near each eye-margin above level of antennæ; the four basal annulations of 3rd joint rather broader than in ♂ *Thorax* black, dorsum wholly covered with whitish-grey tomentose pubescence; in perfect specimens, if viewed from in front, a median stripe surrounded by four spots arranged in a square can be seen, composed of gold-brown tomentose pubescence; some longer whitish-grey hairs below shoulders. Scutellum large, with grey and golden-brown admixture of tomentose pubescence; spine placed at each hind corner, yellowish brown; a fringe of white hairs depends from the hind margin. *Abdomen* black; 2nd segment wholly, 3rd narrowly on hind margin and more broadly towards sides and along side-margin of segment, 4th broadly on hind margin (especially towards and along the side-margins), 5th with a large median triangular spot (its base on hind margin of segment), very shortly but distinctly whitish (occasionally rather golden) pubescent; ground-colour of extreme side-margins of segments brownish orange; venter blackish, with extremely short whitish pubescence. *Legs*: coxæ black, brownish orange at tips; hind pair brownish orange behind; femora and tibiæ rather shining black, the former brownish orange at base and narrowly at tips; tibiæ broadly brownish yellow at base, narrowly brown at tips; front tarsi blackish, posterior metatarsi yellowish, remaining joints brown; all legs with short greyish pubescence, which is more brownish yellow on tarsi, especially the front pair. *Wings* grey, yellowish brown about the centre; stigma slightly darker brown; halteres yellow.

Length, $6\frac{1}{2}$–9 mm.

Described from a long series of both sexes in the Indian Museum, Pusa collection and my own, from many parts of India and Ceylon, where it appears to be generally distributed and common from March to October on rotten papaya-stems, plantains, and melons.

Mr. Howlett has taken it "at sex play around dead leaves, Pusa, 15. iii. 1912."

Larva. This is 11 mm. in length, whitish, oblong, the 4th segment truncate, the three anterior segments much narrower and apparently withdrawable into the 4th; 1st segment rather elongate, very narrow; 4th to 12th segments about equal in length,

anal segment longer, rounded at tip; each segment bearing a transverse row of rather long curved yellow bristles on both upper and under sides, one or more being also present along the sides. The surface is covered with minute white particles, apparently purposely attached to its body. Found in rotten papaya-stems.

25. Clitellaria bistriata, *Brun.*

Clitellaria bistriata, Brunetti, Rec. Ind. Mus. vii, p. 452 (1912).

♂ *Head* with vertex wholly occupied by the ocellar tubercle, black, shortly black pubescent; occiput blackish, the orbit bare, but a little whitish-grey hair on lower part; eyes closely contiguous, with dense dark brown hair; frontal triangle black, a little whitish-grey hair on its uppermost part; underside of head with whitish hair. Antennæ black, normal. *Thorax* black, with minute black pubescence; the anterior margin and two moderately wide dorsal stripes extending from the anterior margin to the scutellum, bearing very short golden-brown hairs, these hairs also appearing on, behind, and below the shoulders; at the extreme lower anterior corner of the dorsum is a reddish-brown, bare, prominent, but very small callus; some greyish hair on posterior corners of lower part of thorax. Scutellum rather broad, black, with microscopic black pubescence, some longer black hairs above and ragged dirty grey hair on underside; a slightly curved, moderately long, obtusely pointed spine at each extreme posterior corner. *Abdomen* black, microscopically pubescent, with some very short greyish pubescence towards the sides, rather more extensive on first two segments, on posterior margin of penultimate segment, and covering most of the last segment. Venter black, with very short greyish pubescence. *Legs* black, with microscopic pubescence, and some very short greyish-white hair on underside of anterior femora; the pubescence on the lower side of the tarsi dark brown. *Wings* with anterior part deep brown, becoming a little lighter on posterior two-thirds, but still dark brown; stigma small, blackish brown, veins deep black; halteres black, stem yellowish.

Length, 8–9 mm.

Described from a ♂ from Bhowali, Kumaon District, 5700 ft. (*Dr. A. D. Imms*), now in the Indian Museum; Shillong, 4900 ft., 31. v. 1918 (*Rao*).

Genus **LASIOPA**, *Brullé.*

Lasiopa, Brullé, Expéd. Morée, iii, pt. 1, p. 307 (1832).
Cyclogaster, Macquart, Hist. Nat. Dipt. i, p. 256 (1834).
? *Inermyia*, Bigot, Ann. Soc. Ent. France, (3) iv, p. 82 (1856).
? *Inermia*, Bigot, *op. cit.* (3) vii, p. 210 (1859).

GENOTYPE, *Lasiopa peleteria*, Brullé (Europe).

Head with epistome arched, but not snout-like. Antennæ rather long; 1st and 2nd joints subequal; 3rd elongate, conical, with four annulations, ending in a two-jointed style. Eyes very hairy, quite

or practically contiguous in ♂, broadly separated in ♀ Proboscis short or lengthened, porrect, with moderately large labella; palpi with three distinct joints. *Thorax* elliptical; scutellum unarmed. *Abdomen* broader than thorax, elliptical, arched, five-segmented. *Legs* moderately long and stout. *Wings* with 3rd vein distinctly forked; 4th longitudinal vein with four faint veinlets, of which the 4th originates near or directly from the 2nd basal cell.

Range. Europe, West Asia, North Africa, South Africa, Orient, New Zealand, South America.

Life-history unknown. The perfect insects occur on umbelliferous and other flowers, and often become rather sluggish in their habits.

26. **Lasiopa villosa**, *F.*, var. **himalayensis**, *Brun.*

Nemotelus villosa, Fabricius, Ent. Syst. iv, p. 270 (1794).
Lasiopa villosa, var. *himalayensis*, Brunetti, Rec. Ind. Mus. i, p. 117 (1907).

♂ ♀ *Head* black, with rather long, shaggy, yellowish-grey hair; eyes in ♂ not quite contiguous; frons in ♀ one-third width of head, sides parallel, with rather long golden-yellow pubescence; face similar, with a rather small elongate spot on each side in ♀ at level of antennæ, contiguous to inner margin of eye; proboscis dark brown, not prominent; underside of head with greyish pubescence; antennæ blackish brown. *Thorax* black, with yellowish-grey pubescence, which is shorter in the ♀ *Abdomen* black: an elongate yellowish spot towards each side on hind border of 2nd, 3rd, and 4th segments, all the spots subequal; 5th segment with distinct yellow hind margin. *Legs* blackish brown. *Wings* brownish grey; halteres whitish yellow.

Length, 9–10 mm.

Described from three specimens in my own collection from Mussoorie, v. 1905 (*Brunetti*), and others from Kumaon, W Himalayas, 6300 ft., 11. v. 1911 (*Kemp*); Naini Tal, vi. 1893 [Lucknow Museum]; Dungagali, Hazara Dist., 8000 ft., 21–24. v. 1915 (*Fletcher*).

The only difference from typical European specimens is that the abdominal yellow spots are not turned up and widened at their inner ends.

Genus **OXYCERA**, *Mg.*

Oxycera, Meigen, Illig. Mag. ii, p. 265 (1803).
Hypoleon, Duméril, Expos. Meth. Natur. (1801).
Heteroxycera, Bigot, Ann. Soc. Ent. France, (3) iv, pp. 63 & 85 (1856).

GENOTYPE, *Musca hypoleon*, L. (Europe); by designation of Curtis, 1833 (as *trilineata*, F.).

Head with epistoma smooth, a little arched; eyes from bare in both sexes to densely pubescent in ♂ (in which case ♀ has some pubescence too), contiguous in ♂ for a considerable distance, the

upper facets much larger than the small lower ones and generally sharply delimited from them; in ♀ wide apart, with uniform facets; occiput with lower half considerably puffed out. Proboscis retracted, with broad labella; palpi rather inconspicuous. Antennæ elongate, first two joints subequal, 3rd spindle-shaped or peg-shaped, with four annulations and a two-jointed apical or subapical bristle. *Thorax* oblong, rather arched, moderately pubescent; humeri and posterior calli prominent; scutellum with two spines. *Abdomen* short and round, very arched, 5-segmented. *Legs* simple, short, weak. *Wings* with normal venation; 3rd longitudinal vein forked or simple; 4th vein with three endings, the 3rd often weak or absent; posterior cross-vein absent, upper branch of 5th vein forming part of lower side of discal cell, the latter often indistinct: alulæ well developed.

Range. Europe, Asia, North America, and one species from Caffraria.

Life-history. The larva lives in moist mud among *Confervæ.* The flies frequent leaves and flowers in the sunshine near streams and damp situations, where they are very active; on sunless days they settle on the underside of leaves near the ground. The metamorphoses of several European species are well known.

These insects are rather small, nearly bare, flies, generally of a black colour with conspicuous yellow spots.

O. signata is mainly a black species and *O. albomicans* a yellow one.

27. **Oxycera signata**, sp. nov.

♂ *Head*: eyes with dense brown pubescence, contiguous for a considerable distance, leaving vertical and frontal triangles about equal in size, black; former with black hairs and three brownish ocelli on an elevated prominence; latter bare, shining; face black, with a long oval patch of short snow-white pubescence adjacent to the eye-margin on each side; no postocular orbit; occiput black; proboscis orange-yellow; underside of head with short white hairs. Antennæ black, first two joints subequal, 3rd as long as first two together, with four annulations and subapical arista. *Thorax* shining black, with moderately dense brownish-grey pubescence; a pair of widely separated, pale yellowish, narrow, longitudinal dorsal stripes, not quite reaching either anterior or hind margin of dorsum; an elongate bright lemon-yellow spot on each side of dorsum from prothorax up to the suture, and a large orange-yellow one on each posterior angle of dorsum; pleuræ black, with whitish pubescence and a callus-like long yellow stripe from prothorax (where its end is contiguous to the stripe on the side of the dorsum immediately above it) to root of wing. Scutellum bright lemon-yellow, with brown pubescence, hind margin black; metanotum shining black, microscopically pubescent. *Abdomen* black, moderately shining, with microscopic brown pubescence and a little white hair at sides of 1st segment, which latter is narrowly yellow at base; a large subtri-

angular spot on 3rd segment on each side-margin reaching from anterior nearly to posterior margin; a smaller oblong one placed endways at middle of side-margin of 4th segment; and a small semicircular apical one on last (5th) segment; venter black, with a little sparse pale pubescence. *Legs* black, with the following parts yellow: tips of femora broadly and posterior pairs indistinctly at base, front tibiæ broadly at base, middle pair wholly and hind pair narrowly at base and tip, also posterior metatarsi and 2nd joint of hind tarsi; all legs microscopically pubescent. *Wings* colourless; anterior veins and stigma pale yellowish; halteres bright yellow.

Length, 5 mm.

Described from a single ♂ in the Pusa collection from India, probably from Mussoorie.

Type presented to the British Museum.

28. **Oxycera albomicans**, sp. nov.

♀ *Head* wholly bright sulphur-yellow. Frons and face fully one-third of head, very slightly narrower at about middle of frons; frons rather broader on lower part; eyes bare; upper eye-margins of frons narrowly black; a thin line running from the corner of each eye diagonally to vertex at each side of vertical spot; an elongate black spot on vertex, embracing the ocelli, pointed at anterior end; an oval or leaf-shaped one of moderate size in middle of frons and a small elongate, vertically placed one immediately above base of antennæ; the latter wholly brownish orange, of normal size; arista black; lower sides of face (viewed from above) with snow-white shimmer; mouth-region and proboscis brownish orange; postocular orbit very broad, lower part with whitish shimmering tomentum and microscopic pubescence; occiput black. *Thorax* sulphur-yellow, microscopically punctate, with very short yellow pubescence; dorsum with three longitudinal black stripes, the median one slightly the widest and reaching front margin, the side-stripes just failing to reach it—all three narrow and united on hind margin; a small black vitta just above wing-base. Lower part of thorax, front part of sternopleura and a contiguous triangular spot on mesopleura, black; pleuræ and lower part of thorax with a little microscopic white pubescence. Scutellum yellow, with a little microscopic black pubescence; spines rather long, tips a little darker. *Abdomen* sulphur-yellow, microscopically punctate, emarginations of segments very indistinct; two broad black transverse bands, broader still in the middle of each, lying apparently over the junctions of 2nd and 3rd segments and of 3rd and 4th segments respectively, united by a short black median stripe; the anterior transverse band broadly united to the convex side of a semicircular band, which has its ends on the anterior corners of the 1st segment, but just failing to attain the actual margin; hinder transverse band united by a median black longitudinal stripe to an arched narrower black

transverse band placed on base of 5th segment, the middle part encroaching over hind margin of 4th segment. Venter yellowish, with microscopic pale yellow pubescence. *Legs* yellow or brownish yellow; front tarsi wholly, apical half of middle pair, hind tibiæ (except at tips), and last four joints of hind tarsi dark brown. *Wings* colourless; veins yellowish; 3rd vein forked towards tip; halteres bright yellow.

Length, 4½ mm.

Described from two ♀♀ from Abbottabad, N.W Frontier Province, vi. 1916 (*Fletcher*).

Type sent to the British Museum; co-type in Pusa collection.

The abdomen might equally well be described as black with the base narrowly and tip more broadly yellow, and three pairs of yellow side-spots, the first pair triangular, the 2nd and 3rd pairs much larger and irregularly oblong.

Subfamily STRATIOMYINÆ.

Head short, rather flattened in front; antennæ with 3rd joint elongate, no arista. *Thorax* subquadrate, often only slightly arched; scutellum generally with two spines. *Abdomen* 5 to 6-segmented, generally subquadrate, not much longer than thorax, often much flattened and frequently with obvious pale markings. *Legs* of moderate length and strength, or somewhat weak. *Wings* with 3rd vein generally forked, ending far before wing-tip; 4th vein with three terminations or veinlets, seldom reaching wing-margin, one or more often absent or extremely weak; posterior

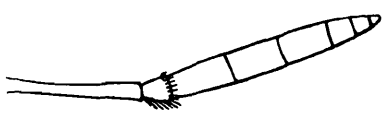

Fig. 2.—*Stratiomyia*, antenna.

Fig. 3.—*Odontomyia*, antenna.

cross-vein present, so that the 5th vein never forms any part of the discal cell; anal cell closed near wing-border; 5 posterior cells, united on wing-margin. Wing in repose folded closely over middle of abdomen, leaving side-margins exposed; alar squamæ small, thoracic pair large, pubescent.

The principal characters of this subfamily taken in conjunction are the subquadrate abdomen of the typical genera (*Stratiomyia*, *Odontomyia*), the elongate antennæ devoid of arista, and the presence of the posterior cross-vein. Larva peripneustic, last segment more or less long and narrow.

Table of Genera.

1. Third antennal joint with at most six annulations .... . 2.
   Third antennal joint with seven or eight annulations CYPHOMYIA, Wied., p. 57.

2. First antennal joint three or more times longer than 2nd . . STRATIOMYIA, Geoff., p. 58.
First antennal joint less than three times as long as 2nd, generally much less ODONTOMYIA, Mg., p. 61.

The above distinctions are purely arbitrary, but each genus has a facies peculiarly its own, which the student will soon recognise.

Genus **CYPHOMYIA**, *Wied.*

Cyphomyia, Wiedemann, Zool. Mag. i, p. 3.(1819).

GENOTYPE, *C. auriflamma*, Wied. (Tropical America); designated by Brauer, 1882.

Head as broad as thorax, semicircular; eyes bare (occasionally just perceptibly hairy), in ♂ closely contiguous for a considerable distance; frons in ♀ rather broad, sides approximately parallel; postocular orbits in ♀ broad. Antennæ with 1st joint moderately long, broader at tip; 2nd cup-shaped, half as long as 1st; 3rd cylindrical, tapering, of eight subequal annulations, practically bare. *Thorax* considerably elongate, much narrowed in front, moderately arched, anterior corners rather angular; in many species with three lighter longitudinal stripes. Scutellum rather large, broader than long, trapezoidal, with two spines that are longer and more divergent in ♂ than ♀ *Abdomen* subglobular, thick, about as long as thorax, 5-segmented; 1st segment very short, mostly hidden by scutellum. A generic peculiarity is the presence of hair-spots towards the sides of the last segment, placed on its anterior margin. *Legs* rather long, especially the femora, simple, slender; tarsi generally longer than tibiæ. *Wings* fully developed, considerably longer than abdomen and folded over it when at rest.

Range. North, Central and South America, South Africa, India, Sumatra.

29. **Cyphomyia indica**, sp. nov.

Head wholly bright orange, bare, including the thick postocular orbits, which are distinctly demarcated from the vertex by a narrow groove; frons about one-third width of head, barely broader at vertex; underside of head with a little short white pubescence towards the eye-margins; eyes and proboscis black. Antennæ with 1st and 2nd joints dark reddish brown, 3rd black, with eight distinct annulations, three times as long as 1st and 2nd together. *Thorax* deep black, with rather dense short grey and brownish-grey pubescence, which is a little longer and more whitish posteriorly and on the concolorous, rather large, nearly oblong scutellum; spines of latter tipped with brown; pleuræ blackish with a little whitish pubescence. *Abdomen* much broader than thorax, nearly circular, brilliantly shining violet-blue, with very short whitish pubescence; venter similar. *Legs* black, with whitish pubescence; knees barely perceptibly brownish orange;

more than basal half of front metatarsus, and the hind metatarsus wholly, and most of the succeeding joints brownish orange; pubescence of legs black. *Wings* uniformly rather dark brown, a little lighter at base and darker about the stigma; halteres pale dull orange.

Length, 9 mm.

Described from a unique specimen (genital organs missing) in the Indian Museum from Kalimpong, 600–4500 ft., Darjiling District, iv–v. 1915 (*Gravely*).

Genus **STRATIOMYIA**, *Geoff.*

Stratiomys, Geoffroy, Hist. d. Ins. ii, p. 475 (1764). *
Stratiomys, Fabricius, Ent. Syst. iv, p. 262 (1794); Meigen, Illig. Mag. ii, p. 265 (1803).
Stratiomyia, Macquart, Dipt. Exot. i, pt. 1, p. 179 (1838); Brunetti, Rec. Ind. Mus. i, p. 125 (1907).
Hoplomyia, Zeller, Isis, xi, p. 882 (recte 828) (1842).
Stratiotomyia, E. L. Arribalzaga, Bol. Acad. Nat. Cienc. Cordoba, iv, p. 128 (1882).

GENOTYPE, *Musca chamæleon*, L. (Europe); by designation of Latreille, Consid. Gen. (1810).

Head semicircular, face arched, postocular orbits thickened, especially in ♀; proboscis comparatively small; palpi small; eyes in ♂ practically contiguous, the upper facets often much larger than lower ones, wide apart in ♀; in both sexes either bare or hairy, sometimes a sexual character. Antennæ approximate at base, diverging after 1st joint, which is very much longer than 2nd; 3rd joint elongate, cylindrical, bare, with five or six annulations (occasionally an annulation subdivided). *Thorax* subquadrate, broader behind, pubescent; scutellum two-spined. *Abdomen* broader than thorax, slightly arched, subquadrate, shoulders angular; whole dorsum sparsely, moderately, or somewhat densely pubescent; wings folded one above the other at rest, lying within the side-margins of the abdomen; genitalia small. *Legs* moderately stout, shortly pubescent. *Wings* mainly as in *Odontomyia*; 3rd vein forked, 4th vein terminations (three) long, curved, nearly reaching wing-margin, the hindmost more or less parallel with upper branch of 5th vein; posterior cross-vein present but sometimes small; anal cell closed near wing-margin; alar squamæ small, thoracic large and pubescent.

Range. World-wide except Australia and the Ethiopian Region.

Life-history. Metamorphoses of more than one European species known. Larvæ fusiform, broadest before the middle; known as

* [In this work Geoffroy did not accept the binary system of nomenclature upon which all our modern zoological classification is based; it has therefore been ruled that all generic names therein proposed by him are just as invalid as pre-Linnæan names. The authorship of *Stratiomys* should thus be attributed to Fabricius.—ED.]

"rat-tailed maggots;" some are aquatic, hanging head downwards by their tails, probably living on minute organisms; some live in mud or moist sand. The pupa floats free. The imagines frequent Umbelliferæ in moist situations.

Table of Species.

1. Hind margin of 3rd and 4th abdominal segments with uninterrupted yellow band	*fulvescens*, sp. n.
Hind margin of 3rd and 4th abdominal segments with a pair of elongate spots, well separated	2.
2. Thoracic pubescence moderately thick and long; scutellum black, except the narrow yellow hind margin and spines; ♀ with two conspicuous yellow postvertical spots, sometimes united	*barca*, Walk.
Thoracic pubescence extremely short and sparser; scutellum all brownish yellow; ♀ with no postvertical yellow spots	*micropilosa*, sp. n.

30. **Stratiomyia barca**, *Walk.*

Stratiomys barca, Walker, List Dipt. Brit. Mus. iii, p. 530 (1849).
Statiomyia barca, Brunetti, Rec. Ind. Mus. i, p. 125 (1907).

♂ ♀ *Head*: eyes contiguous in ♂ for more than half their height; shortly and sparsely pubescent; upper facets distinctly but not greatly larger than lower ones; vertical triangle black, with a few yellow hairs; ocelli large, brownish; antennæ black; frons, face (punctulate), and lower part of head black, with long, rather shaggy, bright yellow hair; occiput black, with very sparse pale pubescence; hind margin of eyes with a fringe of microscopic yellow pubescence. In ♀, frons and face nearly half width of head, sides parallel, black; behind vertex two conspicuous bright yellow oval spots, sometimes united as a large semicircular spot; two very large elongate yellow calli on frons placed diagonally, the inner ends nearly contiguous, the outer ends touching eyes and descending below level of antennæ; colour of calli extended to sides of face broadly; a broad median black stripe on face, which is covered with whitish pubescence; posterior margin of eyes with merely an extremely short fringe of whitish pubescence; a considerable thickening of the orbit on lower half, where it is yellow. *Thorax* black, punctulate, slightly shining; closely clothed with dense, rather long, brownish-yellow pubescence, which is much paler on pleuræ; scutellum similar, hind border and spines brownish yellow. *Abdomen* black, slightly shining, with an elongate moderate-sized yellow spot on hind border at sides of 2nd segment, and elongate spots similarly situated on 3rd and 4th segments; 5th segment with a elongate yellow spot, often paler than the others, placed longitudinally, not attaining anterior margin but extended at lower end for a short distance each way on hind margin of segment. Pubescence in ♂ brownish yellow, dense and fairly long over all the surface; in ♀ black, dense but

very easily overlooked; a little pale yellowish-white pubescence about the shoulders, sides, and tip. Venter in ♂ with greater part of centre of each segment and the hind border yellowish, rest black; in ♀ the yellow part is much paler or even whitish, and of much less extent; in some specimens almost confined to hind borders except on the 2nd segment. *Legs* mainly black; knees more or less broadly brownish yellow; hind tibiæ pale brown with a more or less distinct, moderately narrow ring at middle and tip; all tarsi brownish yellow, a little darker above at tips; pubescence on legs yellow. *Wings* pale grey; anterior and basal parts brownish or yellowish brown, limited by discal cell and anal cell; halteres pale yellow, occasionally green.

Length, 10–12 mm.

Described from several of each sex in the Indian Museum; Jhelum Valley, 5200 ft., and Srinagar, 6000 ft., Kashmir, vii–ix. 1916 (*H. T Pearse*). Described originally from China.

Type in the British Museum.

31. **Stratiomyia micropilosa**, sp. nov.

♀ Very near *barca*, Walk., differing as follows:—

The large yellow postvertical spot is entirely absent, as are the two elongate frontal ones, the latter being replaced by a rather obscure subquadrate median chestnut spot just above antennæ; lower posterior orbit of eyes whitish, not yellow. The dull yellowish pubescence on dorsum of thorax almost microscopic and much sparser; scutellum wholly yellowish, with concolorous tomentum. Abdominal spots brownish orange; side-spots on 2nd segment more triangular, their upper angles only just touching front corners of segment; those on 3rd segment similar but slightly smaller; those on 4th segment smaller still, but partaking more of the nature of a triangular spot than a linear one as in *barca*. Tibiæ more narrowly pale at base; hind pair similar to anterior tibiæ.

Length, 12 mm.

Described from a single ♀ in the Indian Museum from Maymyo, Burma, v. 1910 (*H. L. Andrewes*).

32. **Stratiomyia fulvescens**, sp. nov.

♂ *Head* with eyes shortly but not conspicuously pubescent, the very narrow inner orbits contiguous for about half the distance from vertex to frontal triangle; vertical triangle black, elevated, with some brownish-yellow hairs; ocelli dull yellowish; frontal triangle small, black with brownish hairs; face and head below antennæ wholly black, with rather thick and long whitish-grey pubescence; occiput black, with grey pubescence, no definite posterior orbit to eyes; proboscis brownish yellow. Antennæ black, tip of 2nd joint dark brown; 1st joint about five times as long as 2nd; 3rd a little longer than first two together. *Thorax*

wholly black, dorsum entirely covered with dense yellowish-grey pubescence, and sides with the pubescence a little paler. Scutellum black, with yellowish-grey pubescence; hind margin broadly brownish yellow; spines concolorous, with rather long whitish-grey pubescence about their bases. *Abdomen* moderately shining black, with rather dense, brownish-yellow pubescence on dorsum of 2nd, 3rd, and 4th segments, the pubescence paler on anterior corners and whitish on 5th and 6th segments. A rather large triangular orange spot on hind border towards each side of 2nd segment, the inner end of each narrowed to a fine point, the base of the spot placed on the side-margin but extending only halfway to the anterior margin; hind margin of 3rd segment orange, the colour very narrow in centre of segment, much broader towards sides but narrowed again just on side-margin; a similar orange hind margin to 4th segment and a fair-sized orange triangular spot on 5th, with its base on hind margin; 6th segment all orange; the extreme side-margin of all segments orange, except the anterior half of 2nd segment. Genitalia brownish orange, small, apparently consisting of a median cylindrical piece and a small lamella on each side. Venter with 2nd segment wholly, 3rd broadly, and 4th narrowly on hind margins, brownish orange. *Legs* black, with grey pubescence on femora and tibiæ, yellowish on tarsi; tips of all femora, basal half of hind pair, base and tips of anterior tibiæ, hind tibiæ wholly, and all tarsi orange. *Wings* pale brownish grey, veins a little darker; halteres orange.

Length 12 mm.

Described from a single ♂ from Taro, Peshawur District, N.W India, 16–19. v. 1915 (*Fletcher*); presented by him to the British Museum.

Near *S. barca*, Walk., but in that species the abdominal orange ("tawny") spots are not united to form a band; the tibiæ are piceous and the legs have tawny pubescence.

Genus **ODONTOMYIA**, *Mg.*

Odontomyia, Meigen, Illig. Mag. ii, p. 265 (1803); Brunetti, Rec. Ind. Mus. i, p. 126 (1907).
Opseogymnus, A. Costa, Il Giamb. Vico Napoli, ii, p. 443 (1857).
Psellidotus, Rondani, Arch. p. l. Zool. Modena, iii, p. 78 (1863).
Eulalia, Kertész, Kat. Dipt. iii, p. 62 (1908).

Genotype, *Musca hydroleon*, L. (Europe); by designation of Westwood (1840).

Head about as broad as thorax, transverse; eyes rather flattened, bare or hairy, contiguous in ♂, upper facets larger than lower ones, broadly separated in ♀; face prominent, pubescent; proboscis rather long; palpi small, cylindrical. Antennæ with first two joints short, 1st longer than 2nd; 3rd much longer, cylindrical, tapering, with four to six annulations, last two sometimes

forming an apical style, with or without a minute terminal bristle (fig. 2). *Thorax* subquadrate or oblong; scutellum with two spines. *Abdomen* 5-segmented in ♂, 6- or 7-segmented in ♀, normally barely broader, sometimes much broader than thorax, generally nearly bare; genitalia small. *Legs* simple. *Wings* of normal Stratiomyid type; anterior veins crowded together; 1st and 2nd veins almost anastomosed, rather short, 3rd vein normally forked, both branches ending far before wing-tip; 4th vein with three endings, of which one or more may be incomplete or absent; posterior cross-vein present; squamæ distinct, thoracic pair pubescent.

Range. World-wide.

Life-history. One or two European species have been bred, and *O. cyanea* at Pusa. Larva much as in *Stratiomyia*, but without spine-shaped protuberance. The imagines occur in moist situations, with a partiality for settling on Umbelliferæ.

Table of Species.

1. Shining metallic-blue species (with a general resemblance to the Muscid, *Chrysomyia dux*)	*cyanea*, sp. n., p. 63.
Never metallic; always yellow or brownish, with markings.. . . .	2.
2. Abdomen as well as thorax conspicuously pubescent.	*rufoabdominalis*, Brun., [p. 64.
Abdomen practically bare, normal; thorax generally considerably pubescent	3.
3. Thorax with sharply defined spaces of shining black and reddish brown, and a short golden tomentose stripe from anterior margin; a conspicuous and rather abnormal species..	*pulcherrima*, sp. n., [p. 65.
Thorax dark, with yellowish or grey pubescence; species of normal appearance	4.
4. Some of the femora with distinct broad black bands	5.
No distinct femoral bands, legs generally wholly pale	6.
5. All femora with broad black median band; hind tibiæ with broad apical band	*minuta*, F., p. 65.
Hind femora not banded ..	*rubrithorax*, Macq., [p. 67.
6. (*a*) Abdomen wholly orange; postocular orbits in ♀ moderately broad	*lutatius*, Walk., p. 70.
(*b*) Abdomen with distinct dark transverse bands; postocular orbits in ♀ moderately broad	*transversa*, sp. n., p. 71.
(*c*) Abdomen with dorsal row of spots, more or less forming a median stripe ...	7.
7. Frons in ♂ black; facial bump small, blackish; postocular orbits in ♀ moderately broad	*kashmirensis*, sp. n., [p. 67.

Frons in ♂ orange, or if black, then facial bump more or less orange; postocular orbits in ♀ inappreciable . ..	8.	[p. 68.
8. Frons and face all orange in both sexes ...	*dorsoangulata*, sp. n.,	
Frons and face black in both sexes; ♀ with facial bump brownish orange	*solennis*, Walk., p. 69.	

It is impossible to include *viridana*, Wied. (p. 72), in the table, but it falls into section 6, and my *transversa* may be identical with it.

33. **Odontomyia cyanea**, sp. nov.

♂ ♀ *Head* in ♂ with eyes bare, contiguous for nearly half the distance from vertex to frontal triangle; upper facets rich brown or violet-brown, lower ones black; vertex black, with a few black hairs; the small frons and the face and lower part of head bright orange, bare, shining; antennæ orange, 3rd joint from dull orange-brown to blackish, tip generally darker, twice as long as first two joints together, with four annulations and small yellowish apical style; proboscis black; eye-margins developed on inner lower edge of eyes, orange, with a little greyish pubescence; no postocular orbits, the facets running out to the extreme margin above and at sides. In ♀, frons one-third of head, orange, bare, just perceptibly broader at vertex and towards antennæ; latter rather longer than in ♂; no postocular orbits. *Thorax* deep blue, brilliantly shining metallic, closely punctulate, with microscopic grey pubescence; scutellum similar; pleuræ more blackish, more or less tomentose pubescent, with a little longer grey pubescence on mesopleura and sternopleura and below shoulders. In ♀ four longitudinal, silvery-grey, subequal and equidistant tomentose stripes, the two middle ones united on anterior margin; scutellum also covered with silvery tomentose pubescence. *Abdomen* in ♂ deep blue, shining, minutely punctulate; side-margins and tip of abdomen apple-green, sometimes only narrowly (but always continuously) so, but varying in width up to one-third of the abdomen on each side. In ♀ as in ♂, but the green side-margins always very narrow though continuous, but not including the tip, which is always blue in this sex, whereas in ♂ the green tip of the abdomen is always continuous with the green side-margins. Venter wholly apple-green in both sexes. *Legs* black, a little silvery pubescence on outer sides of anterior tibiæ; front tarsi (especially the metatarsi) distinctly broader, thicker and shorter than middle tarsi. *Wings* quite clear; veins in anterior part of wing brownish orange or yellowish; stigma brownish; the 3rd of the faint veinlets issuing from the discal cell practically absent; halteres bright apple-green.

Length, 6½–8 mm.

Described from a long series of both sexes, mostly bred at Pusa, 26. iii. 1908, 2. ii. 1909, 3–18. iii. 1909. *Types* sent to British Museum; co-types in Indian Museum and my collection.

34. Odontomyia rufoabdominalis, *Brun.* (Pl. I, fig. 24.)

Odontomyia rufoabdominalis, Brunetti, Rec. Ind. Mus. ix, p. 265 (1913).

♂ ♀ *Head* black, a little shining: eyes bare, absolutely contiguous for a short space, leaving a very elongate narrow vertical triangle; vertex considerably prominent, with a few black hairs; ocelli pale yellowish; face but little prominent, with short black and grey hairs; antennæ black, 1st and 2nd joints normal, 1st black, 2nd dull brownish (3rd missing); two small tufts of grey hairs immediately above antennæ, and a trace of grey hairs along the sides of face. In ♀, frons one-third of head, sides parallel, and with face wholly slightly shining black, with sparse short black pubescence; the ground-colour similar to that of the thorax; ocelli very distinct, wide apart, brownish yellow, ocellar bump large, moderately elevated; mouth-opening, proboscis, palpi, and lower part of head black. *Thorax* black, with minute white patches, slightly shining, dorsum and sides with moderately thick, not long, black and grey hairs, set in minute black sockets, which give the dorsum a granulated appearance, often two or three hairs emerging from the same socket; small patches or bunches of grey hairs occur around the base of the wing and on the pleuræ. Scutellum clothed like the thorax, with a fringe of rather ragged grey hair on posterior border and a short blunt spine at each hind corner. *Abdomen*: ground-colour of 1st and 2nd segments and major portion of 3rd, 4th, and 5th black, a little shining; the sides of the dorsum, nearly from the shoulders to the extreme tip, and the hind margins of the 3rd, 4th, and 5th, and the bulk of the 6th segment all bright reddish orange with concolorous pubescence; the black parts with sparse black pubescence; a small patch of greyish hairs on hind corners of 2nd segment, and some yellow hairs extend along the narrow red side-edges of the abdomen, nearly or quite to the shoulders. Venter dull reddish orange, becoming brighter towards tip; central part of most of the segments more or less black; pubescence wholly reddish orange, short, depressed. *Legs* black, with a little short greyish hair; under and inner sides of tibiæ towards tips and about the apical half of the anterior and the whole of the hind tarsi (the latter lengthened), orange-yellow, with short golden pubescence. *Wings* yellowish grey; stigmatic region black; major portion of middle of wing from anterior to posterior border darker brown, the colour fading away gradually; halteres buff; thoracic squamæ milk-white, with concolorous soft hairs.

Length, 17 mm.

Described from a ♂, Darjiling, 1000–3000 ft., vi. 1912, and a ♀, Singla, Darjiling Dist., 1500 ft., v. 1913, in the Indian Museum.

A very handsome and conspicuous species.

35. Odontomyia pulcherrima, sp. nov.

♀. *Head* distinctly broader than thorax; vertex and frons fully one-third the width of head, the latter slightly wider towards antennæ, with short black hairs; whole head below antennæ paler yellow, with soft golden hairs; antennæ black, 3rd joint about 2¼ times as long as 1st and 2nd together; proboscis black; occiput yellow, blackish in centre; posterior orbits of eyes narrowly yellow; vertical triangle black, small; ocelli pale orange. *Thorax* with greater part of dorsum down to the suture, except anterior and side-margins, occupied by a large shining black spot, bare except for a broad short stripe of golden pubescence, beginning just behind the anterior margin but reaching only halfway to the suture; on each side behind the suture (just clear of the side-margins) a semicircular black spot (the straight side inwards) and contiguous to the large black spot above the suture, thus leaving an approximately square space occupying more than half the surface behind the suture, and reaching the posterior border of the dorsum with sharply defined sides; this space is reddish brown, and the large anterior black spot just perceptibly encroaches on the anterior margin of it. Scutellum large, reddish brown, as are the spines and the metanotum; sides of thorax wholly pale yellow with bright golden-yellow pubescence. *Abdomen* moderately shining black, bare; basal half of 1st segment, a large subtriangular spot on each side of 2nd extending from anterior to hind margin, an elongate transverse spot towards each side on hind margins of 3rd and 4th segments (those on latter rather smaller), and a long spot narrowed to a point anteriorly on 5th segment, all light yellow. Venter wholly yellowish. *Legs* with coxæ yellowish or yellowish brown, with yellow hair; front legs black, brown at base of femora; on apical half of outer side of tibiæ a fan-like row of stiff black hairs; middle legs black, basal half of femora yellowish white, a similarly-coloured band on middle tibiæ; hind legs black, basal half of femora yellowish white. Pubescence on all legs generally concolorous with ground-colour, some fairly coarse black pubescence at base of middle tibiæ; tarsi with golden-brown pubescence below; pulvilli brownish orange; claws orange, black-tipped. *Wings* pale yellowish brown; costal cell and extreme base of wing, also beyond discal cell, pale grey; stigmatic region blackish brown; veins dark brown; 3rd vein forked very near tip; halteres pale dull yellow.

Length, 10 mm.

Described from a unique ♀ in the Indian Museum from the Peshoke District, Darjiling, 2000 ft., 26. v.–14. vi. 1916 (*Gravely*).

36. Odontomyia minuta, *F.*

Odontomyia minuta, Fabricius, Ent. Syst. iv, p. 268 (1794).
Odontomyia ochracea, Brunetti, Rec. Ind. Mus. i, p. 129 (1907).

Odontomyia submutica, Brunetti, *loc. cit.* p. 130 (1907).
Oxycera indica, Brunetti, *loc. cit.* p. 119 (1907).
? *O. pusilla*, Fabricius, Ent. Syst. iv, p. 271 (1794).

♂ ♀ *Head* with eyes in ♂ microscopically pubescent, barely contiguous at nearest approach, and for a very short distance only, gradually separating to vertex; frons shining black, with yellowish hairs; ocelli yellowish; frontal triangle with yellowish-grey pubescence; face and underside of head yellowish, with a little whitish pubescence; proboscis large, black; antennæ with 1st joint distinctly longer than 2nd, orange-yellow, 3rd brownish, 4-annulated, tip black; occiput black. In ♀, whole head, including the rather broad postocular orbits, yellow or orange-yellow; a broad shining black band across vertex from eye to eye, sometimes with the appearance of being formed of three large contiguous spots; a pair of large oval shining black spots on frons, placed transversely and slightly diagonally; a pair of similar smaller rounded spots below level of antennæ and just below the larger ones. *Thorax* black, with very short golden or greyish pubescence; sides black, a large pale yellow oblong spot below shoulders, another in front of wing-base, the two spots generally connected above; a third yellow spot below wing-base. Scutellum yellow, base black, spines generally extremely small, occasionally normal in size. *Abdomen* of ♂ normally yellowish, with a large rounded or somewhat diamond-shaped spot spread over middle of first two segments; a spot on middle of 3rd segment from anterior to hind margin, narrowed behind; on anterior margin towards sides of 2nd segment, a small spot; a similar larger one on each side of 3rd segment; on 4th and 5th segments a broad band on anterior margin filling about half the surface, the two bands connected by a short median stripe; all the above markings black. In some males the marks are reduced to a dorsal row of small detached rounded or angular spots; in one ♂ the abdomen is wholly yellowish except for a single small black spot on 2nd segment. In ♀ a large spot similar to that of the ♂ spread over middle of 1st and 2nd segments, with a small spot towards each side in a line with it; sometimes the three spots more or less united by a short connecting stripe; in one ♀ the spots were replaced by a definite uninterrupted broad band; a broad black band on anterior margin of 3rd, 4th, and 5th segments nearly filling the sufraces and sometimes united in the median line by a dorsal stripe. Venter in both sexes mainly yellowish. *Legs* brownish yellow; femora with a broad median dark brown band; hind tibiæ with a similar band on apical half, generally leaving the tip pale; tips of tarsi barely darker. *Wings* absolutely colourless, anterior veins and stigma very pale yellow; discal cell unusually small, occasionally larger in individuals; discal cell veinlets almost invisible; halteres yellowish.

Length, 4–5 mm.

Described from several specimens of each sex, including types of

ochracea, *submutica*, and *indica* : Siliguri ; Rampore, Chaka, United Provinces, 23–31. ii. 1907 ; Ranchi ; Bareilly ; Calcutta, 21. iii. 1907, 14. vi. 1907, 22. vi. 1907 (*Paiva*), 23. viii. 1907, 28. ix. 1907. My *indica* was described from Chapra, Bengal (*Mackenzie*).

The four prominent black spots on the front of the head, the bands on the legs (though these are sometimes much paler than usual), the very reduced discal cell, and very small scutellar spines all combine to characterize very distinctly this variable species. The form with wholly yellow abdomen, except for a single small black spot at base of 2nd segment, is represented by a ♂ in the Indian Museum, and *O. pusilla*, F., is probably identical.

37. **Odontomyia rubrithorax**, *Macq.*

Odontomyia rubrithorax, Macquart, Dipt. Exot. i, pt. 1, p. 185 (1838) ; Brunetti, Rec. Ind. Mus. i, p. 128 (1907) ; de Meijere, Tijd. v. Ent. l, p. 224 (1907).
Odontomyia immaculata, Brunetti, *loc. cit.* p. 130.

♂ ♀ *Head* in ♂ black, with short pale hair below ; a shining black tubercle immediately below antennæ, which are dark reddish brown, tips black, 1st and 2nd joints tawny ; eyes large, bare, upper facets much larger than lower ones, contiguous for a short distance ; vertical triangle small, black ; frontal triangle small, reddish brown. In ♀, frons forming one-third of the head, very slightly broader at level of antennæ than at vertex, shining black, with very short silvery-white pubescence. *Thorax* dull black, with short, meagre, golden or brassy pubescence ; sides black, with a little white pubescence ; scutellum black, gold-dusted, spines very short. *Abdomen* pale greenish or yellowish, more or less brownish on apical half ; sometimes wholly pale. *Legs* orange-yellow ; front femora with a narrow brown ring in middle or a streak on underside ; middle femora with a brown streak on underside which is sometimes continued as a ring up the sides ; all tips of tarsi slightly darker. *Wings* almost colourless, anterior veins pale yellowish, the rest almost invisible ; halteres yellow.

Length, 5 mm.

Described from various Indian specimens : Bareilly (*Brunetti*) ; Asansol, 13–14. ii. 1910 ; Calcutta, 12. iv. 1908, 5. iv. 1907 ; Port Canning, 24. xi. 1907 ; Java.

38. **Odontomyia kashmirensis**, sp. nov.

♂ ♀. *Head* of ♂ with eyes bare, contiguous for only a short space ; frons widening gradually to vertex, shining black, practically bare, except for a patch of yellowish-grey pubescence at extreme vertex ; ocelli brown, on a black elevated triangle ; occiput black ; face black, with considerable yellowish-grey pubescence, the median space slightly prominent, more or less shining black, sometimes dark brown, with less pubescence ; mouth-region and palpi yellowish ; proboscis black ; antennæ orange, 3rd joint

with four annulations, a little more brownish with blackish tip. Frons in ♀ as in *O. dorsoangulata*, microscopically punctate, except for a rather wide postocular orange margin which bears very short, almost tomentose, yellow pubescence. *Thorax* black, with rather dense, moderately long, yellowish-grey pubescence, which extends below shoulders and over upper part of sides; lower part of sides with white pubescence. Scutellum bright orange-yellow or greenish yellow, with yellowish pubescence, base narrowly black; spines yellow. *Abdomen* yellowish or brownish yellow; an uninterrupted moderately broad median dorsal black stripe composed of an elongate spot on middle of 1st segment and a large squarish spot (narrowed towards hind margin) on both 2nd and 3rd segments, a similar rather broader spot on 4th segment rounded behind and encroaching on 5th segment. In the ♀ the dorsal stripe slightly broader. Venter brownish yellow, more or less darker towards tip. *Legs* orange, with very short whitish pubescence; coxæ a little brownish, front pair blackish, with white pubescence; tarsi a little darker. *Wings* quite colourless; anterior veins and stigma pale yellowish; halteres yellowish, sometimes apple-green.

Length, 8–10 mm.

Described from a few specimens of both sexes in the Indian Museum (including types) from Kashmir, 1915 (*H. T Pease*); one ♀ from the Jhelum Valley, Kashmir, 5200 ft., vii–ix. 1915 (*Pease*).

This is very like *O. solennis*, Wlk., especially in the ♂, but the difference in the ♀ ♀ proves them to be quite distinct species, as *O. kashmirensis* has broad postocular orbits and in *O. solennis* these are practically absent. The ♂ *O. kashmirensis* has the facial prominence normally black; in *O. solennis* it is brownish orange and more conspicuous.

39. **Odontomyia dorsoangulata**, sp. nov.

♂ ♀ *Head* of ♂ with eyes bare, contiguous for half the distance from vertex to frontal triangle; vertical triangle narrow, black, with a few short yellow hairs; ocelli distinct yellow or brown; frontal triangle and face orange, with a little whitish pubescence; lower part of head pale yellow, with short white pubescence; proboscis blackish; palpi pale yellow; antennæ orange, 3rd joint a little more brownish, with four annulations and a rather long narrow pointed style; occiput blackish, considerably concave. Frons in ♀ at middle one-third width of head, very slightly narrower at vertex, orange; face and lower part of head orange-yellow; frons a little more bright yellowish brown; postocular orbits inappreciable. *Thorax* black, dorsum with very short close golden yellow or brassy pubescence, which, except towards the sides and shoulders, becomes almost tomentose; sides of thorax mainly black about the centre, with short whitish

pubescence; pale yellowish pubescence on prothorax, and short golden-yellow pubescence broadly just below dorsum and around base of wings; metathorax with a tuft of dirty grey pubescence. Scutellum bright apple-green or yellowish, narrowly black at base; bare, except for a small white fringe on hind margin; spines pale yellow. *Abdomen* in ♂ pale yellowish, varying from greenish yellow to brownish; 1st segment with an elongate transverse black spot on middle of hind margin; 2nd, 3rd, and 4th each with a large black spot in the centre reaching from anterior to hind margin, broader in front; 5th with a more or less similar spot not reaching hind margin; all the spots contiguous, forming an angular black median stripe. In one of the two ♀ ♀ before me the spots are as in the ♂, in the other they are much enlarged, leaving only a moderately broad pale side-margin. Venter yellowish or brownish yellow, sometimes a little marked with brown or with a very narrow median line. *Legs* orange, tips of tarsi barely brownish. *Wings* clear, the stronger veins pale yellow; halteres brownish yellow or apple-green.

Length, 8–11 mm.

Described from four ♂ ♂ and two ♀ ♀ in the Pusa collection, and a number of both sexes in the Indian Museum: Pusa, 10. viii. 1915; Chapra, Bengal; Calcutta, iii., iv., ix., x., xii., common on chrysanthemums; Port Canning, 24. xii. 1907, on Euphorbia; Coimbatore, Madras, "bred from aquatic larva," 7. & 10. x. 1913; Bangalore (*Cameron*).

Types in Indian Museum, from Calcutta, 18. iii. 1907 (♂) and 23. iv. 1907 (♀).

Larva of at least 12 segments, with perhaps an additional one, too retracted to be visible, following the narrow 1st (head) segment; dark nut-brown, with darker marks; venter, rather flattened, yellowish, with a few short hooks on hind margin of the last five segments, apart from the ultimate segment which bears a tuft of whitish curling breathing-tubes. *Length*, 21 mm., exclusive of breathing-tubes.

Three previously-described species must be very near the above, and though none of the descriptions quite apply, it may possibly prove identical with one of them.

40. **Odontomyia solennis**, *Walk.*

Odontomyia solennis, Walker, Ins. Saund., Dipt. i, p. 79 (1856).

♂ ♀ *Head* with eyes of ♂ bare, practically contiguous for only a short distance; trons widening very gradually to vertex, which is black, with very short yellow hairs and reddish-brown well-separated ocelli; frontal triangle very small, black, with silvery-white pubescence; face and underside of head (except broadly around mouth) black, with pubescence that appears dark, viewed from above, and silvery white viewed from below; lower orbits of eyes with white pubescence; mouth-opening broadly

pale yellow; proboscis black; facial tubercle reddish brown, moderately prominent, more or less bare, shining: antennæ orange, 3rd joint more brownish, tip blackish; occiput black. In ♀, frons one-third of head, approximately of uniform width throughout, shining black, with short golden pubescence about antennæ; face similar, with white pubescence; a pair of large bare shining orange-brown or dark brown contiguous spots immediately above and contiguous to antennal prominence; rest as in ♂ *Thorax* black, with short golden-yellow, greyish, or whitish pubescence, which is almost tomentose in centre of dorsum and longer towards sides; sides of thorax black, with rather longer though s ill comparatively short pubescence; occasionally just below dorsum the pubescence is concolorous with pubescence of that region; scutellum narrowly margined with orange, spines brownish orange. *Abdomen* yellowish to brownish; 1st segment with a small elongate spot on middle of hind margin, of variable width; 2nd and 3rd segment with a large median spot on each from anterior to hind margin, narrowed in middle; 4th with a large spot, generally broader than the others, placed on anterior margin, rounded behind, not reaching hind margin; all the spots contiguous to one another, forming a more or less angulated dorsal stripe. Considerable variation occurs in the width of the spots on the 2nd and 3rd segments, which are often very narrow or obsolete; in some specimens (one ♀ from Chapra, Bengal) the abdomen is brownish, bearing only an indistinct narrow blackish stripe on 3rd and 4th segments; in some specimens the abdomen is brownish, with indistinct and irregular blackish marks over the whole centre. Venter brownish or yellowish, with more or less darker marks. *Legs* yellow, tips of tarsi from barely darker to distinctly brown; occasionally a shining brown streak, varying in size, on middle of outer side of hind tibiæ (in one specimen from Chapra, Bengal, extending to more than the middle half of the tibiæ; in this example tips of tarsi dark brown; hind tarsi dark brown, last three joints black). *Wings* quite colourless; anterior veins pale yellow; halteres yellowish.

Length, 7–10 mm.

Described from a number of both sexes in the Pusa collection, taken at Pusa, 29. ii.–28. v. in various years on *Justicia*, indigo, and sugar-cane. Also occurs at Chapra, Bengal; a ♂ in the Indian Museum from Balugaon, Puri District, Orissa, 21.–30. vii. 1913 (*Annandale*), and a ♀ taken by me at Bareilly.

41. **Odontomyia lutatius**, *Walk.*

Stratiomys lutatius, Walker, List Dipt. Brit. Mus. iii, p. 532 (1849).
Odontomyia lutatius, Brunetti, Rec. Ind. Mus. i, p. 129 (1907).

♀ *Head* distinctly broader than thorax; eyes bare; frons rather more than one-third of head, sides parallel, upper half black, moderately shining, with short golden pubescence; ocelli

brownish yellow, ocellar triangle barely elevated; lower half of frons with a median impressed line, shining, brownish yellow; face and lower part of head more yellowish, with short golden-yellow pubescence; occiput black, postocular orbits moderately broad with close golden tomentose pubescence. Antennæ orange, 2nd joint slightly longer than 1st; 3rd reddish brown, 4-annulated, last one slightly darker; the two-jointed style orange-brown. *Thorax* black, with very short dense golden almost tomentose pubescence; sides black, pale yellowish for an indefinite space below wings, wholly covered with very short golden pubescence. *Abdomen* above and below wholly orange-yellow, microscopically pubescent; a faint median impressed line. *Legs* all orange, with minute pale pubescence; tips of tarsi brown. *Wings* colourless, 3rd veinlet from discal cell absent; veins and stigma very pale yellow; halteres orange.

Length, 10 mm.

Redescribed from a ♀ from Chapra, Bengal, and one from Siliguri, foot of Darjiling Hills.

42. **Odontomyia transversa**, sp. nov.

♀ *Head* with frons fully one-third of head, sides parallel, orange, nearly bare; vertex small, black; ocelli yellowish; a pair of rather large diagonally placed brownish spots on each side of upper part of frons with indistinct outlines (possibly sometimes forming a median brown spot of irregular shape and size); face and lower part of head and postocular orbit bright yellow, bare, except for a few scattered short yellow hairs; antennæ orange, 1st and 2nd joints subequal. *Thorax* with dorsum black, with almost tomentose golden pubescence; margins of dorsum, except the anterior one, broadly yellow; sides mainly yellowish; lower part of sternopleura black; a large brown spot on mesopleura; a similar smaller brown spot in front of wing-base. Scutellum wholly chrome-yellow, very narrowly black at base; spines very small, yellow. *Abdomen* yellow, anterior margins of 2nd, 3rd, and 4th segments each with a broad chestnut-brown band extending nearly to the hind margin; a darker, nearly black spot at sides of 2nd, 3rd, and 4th segments contiguous to anterior margin, diffused hindwards into the brown colour; 5th segment mainly dark brown; a small dark brown spot towards each side of 1st segment; venter yellowish. *Legs* orange to tips. *Wings* pale yellowish grey; anterior veins and stigma yellowish; halteres orange-yellow.

Length, 9 mm.

Described from a single ♀ from the Pusa collection taken at Palur, Madras, viii. 1915; sent to the British Museum.

It is just possible that this may be *viridana*, Wied., though his description of the abdomen does not correctly apply; yet species in *Odontomyia* are often so variable that the two may be identical.

43. Odontomyia viridana, *Wied.*

Odontomyia viridana, Wiedemann, Analec. Entom. p. 29 (1824).

"Antennæ and legs reddish yellow, epistome and lower part of frons green, rest of frons ochraceous; thorax black, apex, sides and two stripes clothed with rather golden hairs; posterior corners and sides of thorax green, latter with two reddish-yellow spots; scutellum black in middle at base; abdomen black, with somewhat reddish-yellow segmental margins; at each side of each segment a green transverse spot, which sometimes extends across the whole segment; venter green; wings quite clear, veins pale reddish yellow; halteres yellowish, clubs green; all the green colour emerald-green. Bengal. Westermann's collection."

Subfamily SARGINÆ.

Head semicircular, attached by a thin, rather long, very fragile neck; eyes large, bare or hairy, generally contiguous in ♂; antennæ with 3rd joint not elongate, rounded or rather flattened, always with a distinct arista. *Thorax* roughly oblong; scutellum generally unspined. *Abdomen* 5- or 6-segmented, generally distinctly longer than thorax, in most genera with approximately parallel sides; generally of brilliant metallic-green, blue, violet, or brassy shades; sometimes short and rounded (*Microchrysa*). *Legs* weak and simple. *Wings* with costa nearly reaching wing-tip; 3rd vein generally forked, both branches ending before wing-tip, anterior cross-vein joining præfurca instead of 2nd vein with discal cell—an exceptional character; posterior cross-vein present, so that the 5th vein forms no part of the discal cell; 4th vein with three terminations, which do not reach the wing-margin; 5 posterior cells, all open; anal cell closed near border of wing; squamæ small.

The only character distinguishing this subfamily from the others is that of the anterior cross-vein joining the præfurca and discal cell, instead of the 3rd vein and discal cell as is usual. The more or less rounded 3rd antennal joint with distinct arista, the parallel-sided elongate abdomen, and the brilliant metallic colour of most of the species are other characters mainly applying to this subfamily. The species are thinly pubescent or nearly bare.

Life-history. That of several European species is partly known, but the exact identity of some of them is doubtful, the accounts of them having been written before the species were clearly distinguished. Larva with sides nearly parallel, not tapering behind; each segment with about six rather long bristles transversely placed on both upper and lower surfaces. Lundbeck thinks the metathoracic spiracles may be absent. The larvæ occur in dung and garden mould. The perfect insects are generally distributed and fly with rapidity in hot sunshine.

Table of Genera.

1. Third vein unforked	PROSOPOCHRYSA, Meij., 2. [p. 86.
2. Third vein forked	
Second antennal joint with a thumb-like expansion over the 3rd on inner side ..	PTECTICUS, Lw., p. 73.
Second antennal joint without any such expansion	3. [p. 84.
3. Eyes densely pubescent in both sexes	CHLOROMYIA, Dunc., 4. [p. 85.
Eyes bare or practically so..	
4. Third antennal joint with six annulations.	BRACHYCARA, Thoms., 5.
Third antennal joint with four annulations.	
5. Abdomen elongate; eyes in ♂ not quite contiguous; discal cell veinlets distinct	SARGUS, F., p. 81.
Abdomen short, rounded; eyes in ♂ contiguous; discal cell veinlets very faint.	MICROCHRYSA, Lw., [p. 87.

Genus **PTECTICUS**, *Lw.*

Ptecticus, Loew, Verh. zool.-bot. Ges. Wien, v, p. 142 (1855); Brunetti, Rec. Ind. Mus. i, p. 108 (1907).
Plecticus, Loew, *loc. cit.* v, p. 147 (1855).

GENOTYPE, *Sargus testaceus*, F.; by original designation.

Mainly of the normal Sargid type, but technically non-metallic large yellowish flies, with darker markings and often yellow wings. The 2nd antennal joint distinctly overlapping 3rd on inner side

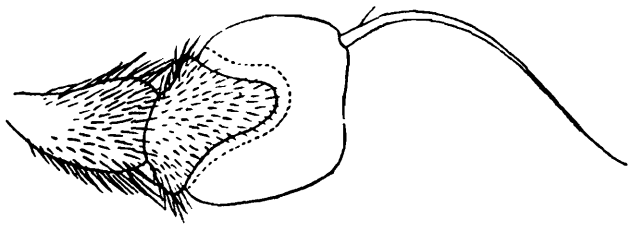

Fig. 4.—*Ptecticus*, antenna, inner side.

by a thumb-like extension; * 3rd joint short and broad, arista very thin; head rounded; eyes in ♂ approximate only and for only a short distance; frontal triangle inflated. Thorax and abdomen as in *Sargus*, but perhaps less pubescent; genitalia in ♂ rather large and free. Wings long; anterior cross-vein exactly at tip of præfurca; † posterior cross-vein occasionally absent or abortive (*australis*).

Range. Central and South Asia, Japan, Orient, South Africa, Madagascar, North, Central, and South America.

* With rare exceptions, according to Williston. It is very pronounced in all the Indian species.

† In all Indian species except *cyaneus*. This character is not necessarily generic.

Table of Species.

1. Body æneous or metallic . ... 2.
   Body never metallic; yellowish, with darker markings; anterior cross-veins at tip of præfurca .. .. 3.
2. Anterior cross-vein at tip of præfurca; body æneous blue, green, or black; femora orange; wings exceptionally long . . .. . [p. 75. *longipennis*, Wied.,
   Anterior cross-vein much before tip of præfurca; body shining violet (♀); femora black; wings of normal length. *cyaneus*, Brun., p. 75.
3. Wings wholly dark brown . . . *aurobrunneus*, sp. n., [p. 76.
   Wings never wholly dark brown, either yellowish on basal and blackish on apical half or practically uniform yellowish grey .. 4.
4. Wings yellowish on about basal half, blackish on remainder .. .. 5.
   Wings uniformly yellowish or yellowish grey (or practically so) .. . .. 7.
5. Genitalia black; tarsi always more or less dark; wings yellow only up to just beyond discal cell. .. .. . 6.
   Genitalia fulvous; tarsi orange to tips; wings yellow nearly up to halfway between discal cell and wing-tip.. .. *wulpii*, Brun., p. 77.
6. First four abdominal segments orange, with or without darker transverse spots or bands, these segments generally similarly marked; rest of abdomen black. . ... [p. 78. *aurifer*, Walk.,
   First four abdominal segments orange, 4th with a large round black spot, conspicuously different from the other segments..... ... *apicalis*, Lw., p. 77.
7. Front metatarsus nearly as long as tibia; whole front tarsus proportionately much longer than in *ceylonicus*, and brown from tip of 1st joint to tip of tarsus; hind tarsus all white. except extreme base of metatarsus; 1st abdominal segment with blackish band; posterior cross-vein practically absent; long. 10–12 mm. [p. 79. *australis*, Sch.,
   Front metatarsus much shorter than tibia; whole front tarsus proportionately much shorter than in *australis*, and only last three joints brown; hind metatarsus all black; 2nd joint and part of 3rd yellowish white or white, rest dark brown or black; 1st abdominal segment without cross-band, but sometimes a little darker in middle; posterior cross-vein distinctly present; long. 14–18 mm. .. *cingulatus*, Lw., [var. *ceylonicus*, nov., p. 80.

44. **Ptecticus longipennis,** *Wied.*

Sargus longipennis, Wiedemann, Analec. Entom. p. 31 (1824); id., Auss. Zweifl. ii, p. 34 (1830); Macquart, Dipt. Exot. Supp. 5, p. 67, pl. i, fig. 11 (1855).
Ptecticus longipennis, de Meijere, Tijd. v. Ent. liv, p. 265 (1911).

♂ *Head* with eyes not absolutely contiguous at any point, but nearly so immediately above the bright lemon-yellow, very inflated frontal triangle, which bears a few yellow hairs; the shining black frons widening gradually to vertex, which bears a few brown hairs; face bright yellow; mouth-opening, proboscis, and neck orange; antennæ yellowish; lower part of head with pale hairs. *Thorax* shining metallic dark blue, or brassy, pubescence pale yellow; a rather broad orange-yellow callus-like stripe from the yellow shoulder to wing-base; hind corners of dorsum orange; prothorax orange, sternopleura shining yellow, rest of sides of thorax æneous brown or blackish, with short pale hairs; scutellum metallic blue, hind margin narrowly orange; metanotum metallic blue. *Abdomen* metallic black, 1st segment reddish yellow at extreme base, 2nd to 4th segments with reddish-yellow bands on hind borders, sometimes extending over the bases of the next segments. *Legs* orange-yellow; hind tibiæ wholly black, hind tarsi all yellowish. *Wings* exceptionally long, very pale yellowish; anterior cross-vein exactly at tip of præfurca; posterior cross-vein absent, 5th vein in punctiform contact with discal cell; 2nd and 3rd veinlets from discal cell parallel, 3rd a little foreshortened; a brown cloud on apical part of wing extending inwards halfway to discal cell; halteres yellow, clubs brown.

Length, 12 mm.

The above description is from a ♂ (without abdomen) in the Indian Museum from Sadiya, Assam, Bigot's description being also incorporated. Recorded by de Meijere from N.E. Sumatra.

The 2nd antennal joint has the peculiar shape characteristic of *Ptecticus,* so the species must be removed here from *Sargus,* as noted by de Meijere (*l. c.*).

45. **Ptecticus cyaneus,** *Brun.*

Ptecticus cyaneus, Brunetti, Rec. Ind. Mus. vii, p. 453 (1912).

♀ *Head* with frons almost linear, brilliantly shining violet and blue, with short soft black hairs; ocelli placed much below the vertex, small, pale yellowish brown, ocellar triangle very slightly elevated; the slight protuberance above the antennæ pale whitish yellow; face blackish, with black hairs, lower part of head reddish brown, prominent; back of head black, with a fringe of white hairs. Antennæ with 1st and 2nd joints black, shining, 3rd joint and the overlapping inner side of the 2nd joint coffee-brown; arista black, apical. *Thorax* dorsally and scutellum brilliantly shining violet, with rather copious brownish-grey hairs; thorax below

dorsum brilliantly shining peacock-green, with short whitish hairs; a small brownish-yellow spot on the shoulders is connected with the wings by a very narrow brownish-yellow ridge delimiting the dorsal and ventral surfaces. *Abdomen* brilliant shining violet, with pale grey hairs; venter similar. *Legs*: femora black, with short white hairs, a little brownish yellow at base; the knees of similar colour and the coxæ with a mark or two of the same shade; tibiæ black, more or less yellowish on apical part, the whole surface with short pale yellow hairs; tarsi dark, with pale hairs; underside of hind tarsi with short, very dark golden-brown pubescence. *Wings* grey; stigma ill-defined; this region of the wing brownish; veins dark brown; halteres yellowish.

Length, 14 mm.

Described from one ♀ in the Indian Museum from Ukhrul, Manipur, Assam, 6400 ft. (*Rev. W Pettigrew*).

46. **Ptecticus aurobrunneus**, sp. nov.

♂ *Head* with vertex and frons down to its narrowest part deep orange; former with golden and brown hairs intermixed, latter with golden hairs only; frontal triangle bright lemon-yellow, nearly bare; ocellar triangle black, ocelli with a reddish tinge; face, mouth, and proboscis orange-yellow; antennæ orange, arista black, orange at base; eyes black; occiput yellowish, reduced, owing to the margins of the eyes themselves curving backwards considerably. *Thorax* dorsally and scutellum dark chestnut-brown, with just a suggestion of three darker stripes, wholly covered with short, dense, though inconspicuous, golden pubescence; propleura, pteropleura, metapleura, and metanotum lighter chestnut-brown; mesopleura and sternopleura shining blackish; whole sides of thorax, even to the mesopleura, with short dense golden pubescence, though at first sight they appear to be bare. *Abdomen* with 2nd to 5th segments dark chestnut-brown, with short dense golden pubescence, which is invisible when viewed from in front, but from that view a large irregularly shaped black spot is seen in the centre of each segment, almost forming a dorsal stripe; 1st segment and tip of abdomen black, with some yellow or golden hairs; genitalia and vertex dark brown, the latter with microscopic golden pubescence, only visible when viewed from in front. *Legs* with front coxæ brownish orange; posterior coxæ dark brown, all with a little golden hair; rest of legs bright orange; posterior femora black on basal half; tips of tarsi a little darker. *Wings* rather dark brown; a small space in both basal and discal cells slightly paler, and traces of similar lighter spaces in the centres of some of the other cells; halteres pale yellowish.

Length, 21 mm.

Described from a unique ♂ in the Indian Museum from Parambikulam, Cochin State, 1700–3200 ft., 16–24. ix. 1914 (*Gravely*).

47. **Ptecticus wulpii,** *Brun.*

Ptecticus wulpii, Brunetti, Rec. Ind. Mus. i, p. 111 (1907); id., *op. cit.* ix, p. 263 (1913).
Ptecticus apicalis, Wulp (*nec* Loew), Notes Leyd. Mus. vii, p. 62 (1885).

♂ ♀ Differing from *P. aurifer*, Walk., as follows :—

Abdomen normally all orange to tip, 1st segment a little darker, and often, if viewed from behind, a large blackish spot is seen in the middle of each segment, sometimes diamond-shaped, sometimes irregular in shape, covering nearly all the surface of each segment; genitalia brownish orange, this latter being the best specific difference of all. Another difference, which seems equally constant, is in the legs, which are all orange to the extreme tips except for the moderately dark brown posterior coxæ and basal half of the posterior femora. The black apical part of the wing is of much less extent, not beginning till some distance beyond the discal cell; some specimens have the wing darkened from the tip only up to midway between the discal cell and the wing-tip.

Same size as *aurifer*.

Described from two ♂ ♂ in the Indian Museum, one ♂ one ♀ in the Pusa collection : Darjiling District, 1000–3000 ft., v. 1912; Singla, iv. 1913; Nilgiri Hills, 3500 ft (*Andrewes*), 7000 ft., v. 1904 (*Rowson*); Parambikulam, Cochin State, 1700–3200 ft., 16–24. ix. 1914 (*Gravely*).

Unless *P. aurifer*, Walk., should prove to have fulvous genitalia, *P. wulpii* is easily separated from all the other species in this group by that character alone. It presents an extraordinary resemblance to the Tipulid, *Psellioph ora compedita*, Wied., and both have been seen by me from the same locality.

48. **Ptecticus apicalis,** *Lw.*

Ptecticus apicalis, Loew, Verh. zool.-bot. Ges. Wien, v, p. 142, pl., figs. 3, 4 (1855); Brunetti, Rec. Ind. Mus. i, p. 110 (1907).
Sargus luridus, Walker, Proc. Linn. Soc. Lond. i, p. 8 (1856).

Brownish red-yellow, shining; 4th abdominal segment with a very large black spot, the next wholly dull black, the rest deep black, rather shining; venter much as upper side of abdomen. Frons very narrow, reddish yellow; lower part whitish yellow; ocelli placed on a blackish cross-band; frontal triangle whitish yellow, puffed up. Antennæ light reddish yellow, 3rd joint barely visibly annulated, tip truncate. Legs concolorous with body; hind tibiæ always darker towards tip; front and middle tarsi with last two joints darker, also hind metatarsus. Wings large, reddish yellow up to beyond discal cell, becoming grey towards hind margin; a large blackish-brown spot filling more than apical third of wing.

Length, 15 mm.

Described from Pulo Penang; in Westermann's collection, Vienna Museum.

49. Ptecticus aurifer, *Walk.*

Sargus aurifer, Walker, List Dipt. Brit. Mus. v, p. 96 (1854).
Ptecticus aurifer, Brunetti, Rec. Ind. Mus. i, p. 110 (1907).

♂ ♀ *Head* with eyes in ♂ with their point of nearest approach distinctly below halfway between vertex and base of antennæ, the space between them perhaps $\frac{1}{6}$ to $\frac{1}{7}$ of a millimetre; thence upwards frons widening gradually till at vertex it is almost 1 millimetre broad; bright orange with orange pubescence; frontal triangle elevated, shining, smooth, lemon-yellow, bare, except for a small tuft of orange hairs just above base of antennæ; face very small, yellowish, as are the very narrow inner lower eye-margins near the very large mouth-opening; occiput black, upper margin with yellow pubescence; ocelli yellow on a black ocellar triangle; proboscis and the very large labella orange-yellow, with a few hairs. Antennæ orange, tip of upper side with a black mark, arista black, orange at base. Frons in ♀ at narrowest part distinctly broader than in ♂, so that it is only about two and a half times broader at vertex than at frontal triangle. *Thorax*: sides, scutellum, and metanotum bright orange, all with a little very short yellow or orange pubescence, which is a little longer on the sternopleura, metapleura, and metanotum; dorsum sometimes with a little more brown in it and sometimes, especially in the ♀, traces of three longitudinal brownish stripes can be seen. *Abdomen* normally with first four segments bright orange, remainder (including genitalia) black, but the orange segments often have more or less brown in them, sometimes in the form of large transverse spots occupying nearly all the segments; sometimes the whole dorsum is uniformly more brownish; the first four segments with very short inconspicuous golden-yellow pubescence, the rest with almost microscopic greyish pubescence. Venter mainly orange on first four segments, remainder black, but 4th, and sometimes 3rd also, often bear large blackish patches. *Legs* all orange, with short yellow pubescence; last two joints of anterior tarsi brown; about apical half of hind tibiæ brown; hind tarsi blackish brown, especially first two joints, underside with rich golden-brown pubescence. *Wings* with basal half up to just beyond discal cell bright orange-yellow, remainder moderately dark brown; veins a little deeper orange, veinlets from discal cell dark brown, 3rd only moderately sinuous; halteres orange.

Length, 12–20 mm.

Described from a series in the Indian Museum, Sarawak Museum, and Pusa collections: Mussoorie, 6500 ft. (*Bond*); Darjiling, 1000–3000 ft., v–vi. 1912; Peshoke Spur, Darjiling

Distr., 4000 ft., v–vi. 1916; Lebong, Darjiling Distr., 4500 ft., 2–9. v. 1909 (*Howlett*); Singla, Darjiling Distr., 1500 ft., iv. 1913; Siliguri, base of Darjiling Hills, 18–20. vii. 1907; Sikkim; Margherita, Assam; Nongpoh, Khasi Hills, Assam, 1000–3000 ft., vi. 1905; also from Matang, Trusan, Klinhang, and Kuching (all Borneo).

This is the commonest Indian species, apparently.

50. **Ptecticus australis,** *Sch.*

Ptecticus australis, Schiner, Novara Reis., Dipt. p. 65 (1868); Brunetti, Rec. Ind. Mus. i, p. 113 (1907).

♂ ♀ *Head*: eyes in ♂ with upper facets very little larger than lower ones, no clear dividing-line, barely contiguous at point of nearest approach, and for a very short distance only; frons widening gradually to vertex, shining black, with a few brown hairs; ocelli rather close together, ocellar triangle small, only slightly elevated; frontal triangle elongate, whitish yellow, bare (in one specimen a pair of dark oval spots in the middle placed longitudinally side by side); face, proboscis, and palpi orange-yellow, labella very large; antennæ orange, arista black; occiput dark, very concave. In ♀, frons comparatively narrow, dull brownish orange or blackish, shining. *Thorax*, scutellum, and metanotum wholly orange, with very short concolorous pubescence. *Abdomen* orange, normally with a transverse deep blue or violet band just behind anterior margin of first four segments, the bands sometimes not reaching the side-margins; 5th segment mainly blue-black, except anterior margin; the bands vary considerably in width, but generally have parallel edges; in one ♀ the bands are replaced by a pair of elongate transverse spots on each segment; occasionally the last two or three segments are almost wholly violet or blackish; genitalia in ♂ prominent, rather large, concolorous; in ♀ very small; venter brownish yellow. *Legs* orange-yellow; hind tibiæ all black; hind tarsi wholly white; anterior tarsi with brownish tips. *Wings* pale yellowish grey; 1st veinlet from discal cell considerably bent downwards at or just before middle; 2nd nearly straight; 3rd foreshortened, near and parallel with 2nd; posterior cross-vein absent, so that upper part of 5th vein is in punctiform contact with lower corner of discal cell; halteres orange, knobs blackish.

Length, 10–12 mm.

Described from several of each sex in the Indian Museum, Pusa and other collections: Kurseong, Darjiling Distr., 5000 ft., 4. vii. 1908 (*Annandale*); Soom, Darjiling Distr., 4000–5000 ft., 16. vi. 1914 (*Gravely*); Kalimpong, Darjiling Distr., 600–4500 ft., 24. iv.–10. v. 1915 (*Gravely*); Sukna, N. Bengal, 500 ft., 1. vii. 1908 (*Annandale*); Rungpo, Sikkim, 1400 ft., 6. ix. 1909; various localities in Bengal, vii., ix.; Pinjore, Patiala State, 17 vii. 1911; Calcutta, 23. vii. 1907 (*Annandale*); Pollibetta, Coorg, S. India,

15–25. v. 1914 (*Fletcher*); Coonoor, Nilgiri Hills, S. India, vi. 1912 (*Capt. Sewell*); Peradeniya, Ceylon, 26. vii. 1910; Margherita, Sadiya, Assam; Tura, Garo Hills, Assam, 1917 (*Kemp*).

51. **Ptecticus cingulatus,** *Lw.*, var. **ceylonicus,** nov.

Ptecticus cingulatus, Loew, Verh. zool.-bot. Ges. Wien, v, p. 143 (1855).

Allied to *P. aurifer*, Walk., except in the wings and genitalia.

♂ ♀ *Head*: frons shining black, with black pubescence, from vertex to point of nearest approach of eyes where they are almost actually contiguous; frontal triangle lemon-yellow or orange-yellow; rest of head as in *aurifer*. *Thorax* as in *aurifer*; traces of three faint longitudinal dorsal stripes in some specimens. *Abdomen* orange, with a transverse oval black spot on each segment from the 2nd to the 5th, placed just behind fore border and quite clear of side and hind margins; the spots larger in the ♀, practically placed on anterior margins, also reaching side-margins on 2nd segment. Genitalia quite differently constructed from those of *aurifer* and *wulpii*; much narrower, composed of a pair of two-jointed claspers and a large curved dorsal plate ending in a narrow style and two lamellæ; the organs placed sideways; genitalia in ♀ small, concealed. *Legs* orange, a brownish streak on outer side of hind femora which curves round to the upper side towards tip, where it dies away; it is not at all conspicuous and is easily overlooked, yet it seems one of the principal characters of the species; hind tibiæ and hind metatarsi black; 2nd and 3rd joints of latter whitish, remaining joints blackish; anterior legs all orange, except the tips of the tarsi, which are a little browner. *Wings* uniformly pale yellowish grey; 3rd veinlet from discal cell more strongly bisinuate than in *aurifer*.

Length, 14–18 mm.

Described from 6 ♂ ♂ and 1 ♀ in the Indian Museum from Kandy, v–vii. 1910; Santi Koppa, N. Coorg, S. India, 4–9. v. 1914.

From the peculiar white 2nd and 3rd hind tarsal joints and the curved streak on the hind femora I am compelled to regard this form as *cingulatus*, Loew, as these characters do not appear in any other species. From his description, however, I originally assumed the wing to be half yellow and half black, as in the *aurifer* group; but it may perhaps be understood to mean yellowish brown at the base and in front, and the remainder more of a smutty brownish colour, although this does not properly agree with the wings in the above-described form. I have seen four specimens in the Sarawak Museum collection from Borneo that agree still more (apart from the same doubt as regards the wings) with Loew's description, as the black abdominal bands are of uniform width and actually reach the side-margins in all cases.

Genus **SARGUS**, *F.*

Sargus, Fabricius, Ent. Syst. Supp. pp. 549, 566 (1798); Brunetti, Rec. Ind. Mus. i, p. 104 (1907).

GENOTYPE, *Musca cupraria*, L.; by designation of Latreille Consid. Gén. (1810).

Head hemispherical, attached to thorax by a slender neck, as wide as broadest part of thorax; face slightly projecting, pubescent; ocelli placed well forward on vertex in a short isosceles triangle, equidistant in some species; eyes bare, separated in ♂ by a narrow frons, wider apart in ♀, upper facets in ♂ scarcely larger than lower ones. Antennæ short, in profile placed below middle of head; first two joints bristly, short, subequal; 3rd joint shortly conical or roughly rounded, with four annulations; arista subapical, long, bare, except at base. *Thorax* with anterior part oblong, widened towards base of wings, posterior part of dorsum rounded; scutellum unarmed, usually concolorous with the metallic-green dorsum and bearing the same short pubescence. *Abdomen* much longer than thorax, with parallel sides or broader posteriorly, brilliantly shining metallic, the ♂ usually green or golden brassy, the ♀ more often blue or violet, moderately pubescent; genitalia small. *Legs* simple, rather long and thin; metatarsi long. *Wings* generally longer than abdomen, over which they fold when at rest; of the usual Stratiomyid type; costal vein nearly reaching wing-tip; anterior cross-vein connecting the præfurca (instead of the 3rd vein) with the discal cell, thus creating the appearance of the 3rd vein being twice forked; 4th vein with three terminations, barely or not reaching wing-margin; posterior cross-vein distinct. Alar squamæ of moderate size, thoracic pair elongate, very prominent.

Range. World-wide.

Life-history. That of several European species is known, the larvæ living in garden-mould, cow-dung, and in the elm.

Some attempt has been made to supplant the name *Sargus* on the ground of its being preoccupied, but the name is too old to be changed now. Verrall also disputes the validity of the alleged preoccupation.

Table of Species.

1. Wings dark brown; length 14–18 mm.	*gemmifer*, Walk.
Wings yellowish	2.
2. Legs all yellow	*metallinus*, F.
Hind tibiæ with broad blackish basal band	*mactans*, Walk.

52. **Sargus gemmifer**, *Walk.*

Sargus gemmifer, Walker, List Dipt. Brit. Mus. iii, p. 516 (1849).
Sargus magnificus, Bigot, Ann. Soc. Ent. France, (5) ix, p. 222 (1879); Brunetti, Rec. Ind. Mus. i, p. 106 (1907).

♂ ♀ *Head* with frons, though very narrow, parallel-sided for

a considerable distance, widening gradually to vertical and frontal triangles, with black hairs throughout its length; upper part blue or violet, merging into green at its narrowest part, and thence to yellow on frontal triangle; antennæ brownish orange; face brownish, with moderately dense yellow pubescence; proboscis brownish orange; occiput dark with marginal fringe of pale hairs. In ♀, frons no wider than in ♂ *Thorax* in ♂ brilliantly shining metallic green, with rather dense short yellow pubescence; scutellum similar; front and hind corners of dorsum, and a stripe from shoulder to wing-base, brownish yellow; sides of thorax almost wholly metallic green, with yellow pubescence and violet reflections. In ♀, thorax deep blue, with soft white pubescence. *Abdomen* in ♂ brilliantly shining metallic cupreous green, with dense deep orange pubescence, which is rather thicker towards sides; venter darker or with violet tinge, shining, with pale yellow microscopic pubescence. In ♀, brilliant violet with a bronze tinge and white pubescence. Genitalia in ♂ consisting of a pair of orange-brown claspers and two upper short dark hairy cylindrical lamellæ. *Legs* in ♂ brownish orange; posterior coxæ shining blackish; hind femora broadly at tips and hind tibiæ broadly at base, blackish; tarsi blackish on upper side, especially hind pair; all legs with minute pale pubescence. In ♀, legs all black, except brownish knees and underside of front tibiæ; tarsi with brown pubescence below. *Wings* distinctly brown, a little darker anteriorly; venation normal; halteres yellowish.

Length, 17–18 mm.

Described from four ♂♂ in the Indian Museum: Mergui, Tenasserim (*Doherty*); Pyinmana, Burma, vi. 1910 (*H. L. Andrewes*); Sylhet; and one ♀ from Tura, Garo Hills, Assam, 1500 ft., vii. 1917 (*Kemp*).

Easily known from all other Indian species by its great size and splendour. The Indian Museum specimens from Tenasserim were named by Bigot as his *magnificus*, but I now feel sure they are synonymous with Walker's *gemmifer*, and possibly *pubescens*, Walp, may be another synonym.

53. **Sargus metallinus**, *F.* (Pl. I, figs. 22, 23.)

Sargus metallinus, Fabricius, Syst. Antl. p. 258 (1805); Brunetti, Rec. Ind. Mus. i, p. 106 (1907); Wiedemann, Auss. Zweifl. ii, p. 36 (1830); de Meijere, Tijd. v. Ent. liv, p. 265 (1911).

Sargus formicæformis, Doleschall, Nat. Tijd. Ned. Ind. xiv, p. 403, pl. iii, fig. 5 (1857).

Sargus pallipes, Bigot, Ann. Soc. Ent. France, (5) ix, p. 222 (1879).

♂ ♀ *Head*: frons in ♂ extremely narrow, with sparse greyish pubescence; slightly wider towards vertex and distinctly broadening towards antennæ; the upper narrower part varying from bronze to bright metallic green, the lower part brownish yellow or brownish; vertex with some brownish yellow hairs. In the ♀, frons at its middle one-seventh width of head, distinctly

though not greatly wider towards vertex and antennæ; varying from brilliant metallic violet-blue to bright green, bearing moderately dense grey pubescence on upper part, and more brownish about the middle; above the antennæ the frons takes the form of a large, bare, shining, pale yellow (sometimes brownish) callus. Face and lower part of head, including proboscis, varying from brownish orange to pale yellowish, with light yellowish pubescence; occiput black; postocular fringe whitish, continuous. *Thorax* with dorsum and scutellum brilliantly shining metallic green, bronze-green, or cupreous in ♂, and bluish green or green in ♀, with dense fine yellow (♂) or whitish (♀) pubescence; pleuræ concolorous, with shorter pubescence. *Abdomen* metallic shining yellowish bronze or cupreous in ♂, violet or blue in ♀, with dense though not conspicuous yellow pubescence towards sides in ♂, the dorsal region often nearly bare; whole surface in ♀ with short white pubescence, a little longer towards sides; venter generally dark brown or æneous, shining, with microscopic pubescence. *Legs* pale yellow, with very short pale yellow (♂) or white (♀) pubescence. *Wings* pale yellowish grey or pale brownish, stigma a little darker; halteres pale yellowish or white.

Length, 9–10 mm.

Described from a considerable number of both sexes in the Indian Museum, Pusa, and Dehra Dun collections and my own. Common and widely distributed in India in May and July to October up to 5000 ft.; also generally distributed in the East, Rangoon, Singapore (both *Brunetti*); Borneo, Java, Amboina, Aru Islands, Shanghai.

Bigot in 1887 described a second species, coming from North America, under the name *pallipes*.

54. **Sargus mactans**, *Walk.*

Sargus mactans, Walker, Proc. Linn. Soc. Lond. iv, p. 97 (1860); Brunetti, Rec. Ind. Mus. i, p. 107 (1907); de Meijere, Tijd. v. Ent. liv, p. 263 (1911).

♂ *Head* with frons extremely narrow, the sides never parallel, widening gradually above and below from point of nearest approach, æneous yellow or brassy, with yellow pubescence on vertical and frontal triangles; ocelli at some distance below vertex, upper ones contiguous to eye-margins; face, mouth-opening, and proboscis yellowish orange, with a little yellowish hair; antennæ orange; occiput black, a fringe of whitish hairs on lower margin. *Thorax* with dorsum, pleuræ, scutellum, and metanotum brilliantly shining cupreous green, with rather dense soft yellow pubescence, which becomes whitish on anterior margin of dorsum; a shoulder-spot, a narrow stripe thence to wing-base, extending over upper part of sternopleura, brownish or yellowish. *Abdomen* brilliantly shining cupreous, sometimes with a green tinge, with rather dense yellow pubescence towards and at sides,

the pubescence in the middle of the segments almost microscopic; venter blackish, shining, with short soft yellow pubescence; genitalia with a violet tinge, rather small, with two terminal, cylindrical, palp-like lamellæ. *Legs* yellow, coxæ more or less black at base, especially hind pair; hind tibiæ slightly constricted just beyond middle, with nearly basal half black; hind tarsi with tips dark; all legs with minute bright yellow pubescence, which is longest on hind tibiæ. *Wings* uniformly yellowish grey; stigma a little darker, brownish yellow; halteres yellowish.

Length, 9–11 mm.

Described from several specimens in the Indian Museum: Bhim Tal, Kumaon, 4500 ft., 19–22.ix.1906 (*Annandale*); Almora, Kumaon, 5500 ft., 10–21.ix.1911 (*Paiva*); Shillong, 4900 ft., 1.vi.1918 (*Rao*); Katmandu, Nepal. It occurs also in Ceylon and the Malay Archipelago.

A variety with a black streak on the posterior femora (two specimens) was taken at Shillong, 5000 ft. (*Fletcher*) and 4900 ft., 30.v.1918 (*Rao*).

Genus **CHLOROMYIA**, *Dunc.*

Chloromyia, Duncan, Mag. Zool. Bot. i, p. 164 (1837).
Chrysomyia, Macquart, Hist. Nat. Ins. Dipt. i, p. 262 (1834).
Myochrysa, Rondani, Dipt. Ital. Prod. iv, p. 11 (1861).
Myiochrysa, Verrall, apud Scudder, Nomen. Zool. p. 204 (1882).

GENOTYPE, *Musca formosa*, Scop.; by Verrall's designation (1909).

Differing from *Sargus* mainly in the densely pubescent eyes, which are contiguous for a considerable distance in the ♂, the upper facets larger than the lower; and wide apart with equal-sized facets in the ♀; 3rd antennal joint longer than in *Sargus*; abdomen rather broader also, especially in the ♀; venation rather more indistinct.

Range. Europe, South Africa, Asia, North America.

Life-history. The common *C. formosa*, Scop., of Europe, has been bred from garden-mould and from *Brassica rufa*.

Some confusion has arisen over the generic names *Chloromyia* and *Chrysomyia* (under which *formosa* was known in Europe for many years), which is concisely cleared up by Verrall (Brit. Flies, v, p. 187). Coquillett claimed designation of the same species as generic type in 1910, presumably unaware of Verrall's priority.

55. **Chloromyia sapphirina**, *Walk.*

Sargus sapphirinus, Walker, List Dipt. Brit. Mus. iii, p. 519 (1849).

"Body bright blue, tinged with purple; head as broad as chest; clypeus white; eyes dark bronze; mouth and feelers black; chest and abdomen finely punctured, thinly clothed with short,

hoary hairs; abdomen nearly elliptical, a little broader and longer than the chest; legs blue, clothed with short hoary hairs; shanks and feet piceous; shanks pale yellow beneath; wings colourless; wing-ribs and veins dark tawny; poisers pale tawny. Length of the body 4 lines, of the wings 7 lines.

"East Indies. From Archdeacon Clerk's collection. In the British Museum."

Though described from the East Indies, it is probably from East India.

Genus **BRACHYCARA**, *Thoms.*

Brachycara, Thomson, Eug. Resa, p. 460 (1868) (1869).

GENOTYPE, *Brachycara ventralis*, Thoms.

Very near *Chloromyia*. *Head* slightly narrower than thorax, nearly hemispherical; face not prominent, convex; mouth-opening large; proboscis short, labella broad; eyes bare. Antennæ short, 3rd joint almost transverse, obconical, a little shorter than 2nd, six-ringed, last two annulations abruptly narrower. *Thorax* with humeri distinct; scutellum semicircular, unspined. *Abdomen* oval, broader than thorax, 8-segmented; last three segments narrower, retracted. *Legs* moderately strong, slightly pubescent; anterior coxæ small, subovate, very little distant from middle pair; hind pair subtriangular; femora clavate fusiform; tibiæ hardly shorter than femora, unspurred; tarsi hardly longer than tibiæ, 1st joint longer than the remaining joints together. *Wings* longer than abdomen.

Range. B. ventralis is the only species.

56. **Brachycara ventralis**, *Thoms.*

Brachycara ventralis, Thomson, Eug. Resa, p. 461 (1869); Brunetti, Rec. Ind. Mus. i, p. 104 (1907).

♂ ♀ *Head* shining, with silvery-white pubescence, thicker below; frontal triangle shining black, a small subtriangular white spot contiguous to each eye; frons with a median furrow; eyes in ♂ broadly contiguous, bare; proboscis yellowish white; antennæ brown, yellow in middle. *Thorax* and scutellum black, with depressed pubescence, which is golden brown and almost scale-like on the humeri; a narrow line on mesopleuræ whitish yellow. *Abdomen* yellowish red, a basal and apical blackish-brown spot; venter wholly shining yellowish red, with very short pubescence. *Wings* subhyaline, veins yellow; halteres pale yellow, clubs large. *Legs* yellowish red, all the tarsi and tips of hind tibiæ blackish brown.

Length, 5 mm.

Cocos-Keeling Islands.

The foregoing is a translation of Thomson's description.

Genus **PROSOPOCHRYSA**, *Meij.*

Prosopochrysa, de Meijere, Tijd. v. Ent. l, p. 220 (1907).

GENOTYPE, *Chrysochlora vitripennis*, Dol.; by original designation.

Near *Microchrysa*. Eyes bare, narrowly separated in ♂, facets of equal size; occipital orbit extremely narrow; frons prominent; antennæ rather short, 1st and 2nd joints subequal, 3rd as long as first two together, with four annulations, the 4th the smallest, pubescent; arista practically apical. Thorax and abdomen subequally long, latter 5-segmented; scutellum unarmed. Third vein simple, 2nd nearly erect; discal cell 5-sided, only two veinlets issuing from it; the 3rd absent, and 3rd and 4th posterior cells therefore united.

Range. India, Java.

The absence of the 3rd veinlet from the discal cell might make the species appear to belong to the PACHYGASTRINÆ, but in that subfamily the fifth posterior cell is in full contact with the discal, through the posterior cross-vein being absent.

57. **Prosopochrysa vitripennis**, *Dol.*

Chrysochlora vitripennis, Doleschall, Nat. Tijd. Ned. Ind. x, p. 408, pl. xi, fig. 2 (1856).

Microchrysa albitarsis, Brunetti, Rec. Ind. Mus. viii, p. 156 (1913).

♂ ♀ *Head* of ♂ with upper part of frons shining black or dark green, very elongate, and narrowed to point of nearest approach of eyes; below this point broad and prominent, brilliantly shining blue or violet; head below antennæ metallic bronze-green, with black or dark brown pubescence; cheeks

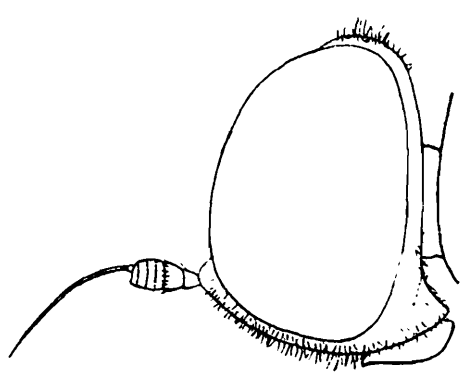

Fig. 5.—*Prosopochrysa vitripennis*, Dol., lateral view of head.

white-haired; proboscis black; occipital orbit very narrow, black, with whitish grey shimmer. Antennæ wholly brown, sometimes 1st joint blackish, 2nd and 3rd yellowish; latter with four annulations; arista long, practically apical, a little thickened basally where there are a few hairs on underside. In ♀, frons

one-fifth width of head, slightly tinged with blue, brilliant violet immediately above antennæ. *Thorax* punctate, wholly brilliantly shining metallic blue or blue-green, with very short whitish pubescence. *Abdomen* metallic black or dark bronze-green, with very short sparse whitish pubescence, which is a little longer round margin and tip; venter darker, nearly black. *Legs* black, with microscopic pubescence; all the tarsi yellowish white except

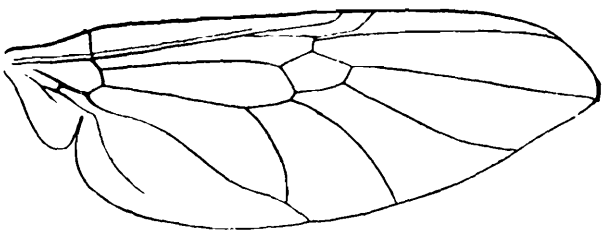

Fig. 6.—*Prosopochrysa vitripennis*, Dol., wing.

at tips. *Wings* clear, veins and stigmatic region yellowish; 3rd vein simple, straight, ending at some distance before wing-tip; halteres apple-green.

Length, 5 mm.

Redescribed from two ♂♂ and three ♀♀ in the Indian Museum, and some in the Pusa collection.

Genus **MICROCHRYSA**, *Lw.*

Microchrysa, Loew, Verh. zool.-bot. Ges. Wien, v, p. 146 (1855); Brunetti, Rec. Ind. Mus. i, p. 103 (1907).
Clorisoma, Rondani, Dipt. Ital. Prod. i, p. 168 (1856).
Chlorosia, Rondani, *op. cit.* iv, p. 11 (1861).

GENOTYPE, *Musca polita*, L. (Europe); by original designation.

Head broader than thorax, face small, slightly pubescent; occiput concave in ♂, posterior eye-orbits distinct in ♀; ocelli equidistant; eyes bare, in ♂ contiguous, upper facets larger than lower ones, in ♀ widely separated, facets equal in size. Antennæ of typical Sargid form, 3rd joint with four annulations, arista practically apical. *Thorax* longer than broad, slightly wider behind, shining metallic, with short dense inconspicuous pubescence. *Abdomen* very short, rounded, shining; pubescence extremely short, though sometimes dense. *Legs* simple, tibiæ sometimes slightly dilated apically. *Wings* of normal Sargid type, terminations of 4th vein less parallel; thoracic squamæ more normally shaped than in *Sargus*, pubescent.

In all minor characters mainly as in *Sargus*.

Range. Europe, Asia, South Africa, North and South America.

Life-history. The common *M. polita*, L., of Europe, seems to breed freely in cow-dung and decaying vegetable matter.

M. calopa differs from *M. flaviventris*, in which the abdomen is unicolorous, by a narrow pale border along the sides and tip.

58. **Microchrysa flaviventris,** *Wied.*

Sargus flaviventris, Wiedemann, Anal. Ent. p. 31 (1824).
Microchrysa flaviventris, Brunetti, Rec. Ind. Mus. i, p. 103 (1907).
Sargus affinis, Wiedemann, *loc. cit.*; Brunetti, *loc. cit.*
Chrysomyia annulipes, Thomson, Eugen. Resa, p. 461 (1869).
Microchrysa gemma, Bigot, Ann. Soc. Ent. France, (5) ix, p. 231 (1879); Brunetti, Rec. Ind. Mus. i, p. 103 (1907).

♂ ♀ *Head* in ♂, vertex black, shining, with a few black hairs; ocelli distinct, red; eyes contiguous for rather more than half the distance from vertex to frontal triangle; upper facets bright brown, much larger than the blackish lower ones; frons blackish, with a few short pale hairs; face brilliantly shining metallic green, bare; proboscis and palpi rather bright yellow; antennæ pale yellow, with 1st and 2nd joints subequal, 3rd rather longer than 2nd, with pale yellow arista; occiput black, very concave; no definite postocular orbit. In ♀, frons forming one-third of the head, rather broader at vertex, brilliantly shining metallic blue-green, carried over the vertex to the blackish occiput and bearing a little short grey pubescence; remainder as in ♂ *Thorax* brilliantly shining metallic green, with very sparse pale yellow pubescence on dorsum and parts of the pleuræ; scutellum similarly coloured. *Abdomen* in ♂ brownish yellow, varying to a little lighter or more reddish individually, with microscopic pale yellow pubescence, 5th segment blackish; venter yellowish, often more or less marked with black. In ♀, brilliantly shining green, with microscopic pale yellow pubescence; venter generally brownish, sometimes yellowish or even metallic green. *Legs* pale yellow; hind femora with broad median brown band and hind tibiæ with broad apical band, both bands sometimes much paler. *Wings* colourless; veins and the rather large stigma pale yellow; halteres yellow.

Length, 3½–4 mm.

Described from a considerable number of both sexes in the Pusa and Indian Museum collections and from other sources from many parts of India, dated March and from June to October. Also from Peradeniya, Ceylon, 15. vii. 1910; Java (*Jacobson*); Sibu, Sarawak, 2. vii. 1910 (*Beebe*). I have taken it myself in Mussoorie and Darjiling. Common and widely distributed in India and the East. Van der Wulp records it from Papua.

M. affinis, Wied., from East India, and *M. gemma,* Big., from Ceylon, are probably synonyms.

59. **Microchrysa calopa,** *Brun.*

Microchrysa calopa, Brunetti, Rec. Ind. Mus. vii, p. 453 (1912),

♀ *Head* with frons broad, bright metallic green on vertex, changing insensibly to brilliant violet-blue just above antennæ, with very short pale yellow pubescence; face metallic green; oral opening brown; eyes dark brown, the upper corners rounded off,

thus widening the vertex considerably; occiput dark; antennæ pale yellow, tip of 3rd joint, which has a slight reddish tinge, shortly pubescent; 1st and 2nd joints with one or two microscopic hairs. *Thorax* with dorsum brilliant metallic green, with very short pale yellow pubescence; venter similarly coloured and pubescent, sharply delimited from the dorsum by a narrow yellow side-ridge at the level of the wings; posterior calli yellowish. Scutellum and metanotum brilliant green, the former with pale yellow hairs and yellow underside. *Abdomen* dorsally violet, not intense, shining, and with a bluish tinge in certain lights, with pale yellow pubescence; the colour covers all the surface except a narrow, irregular, yellow border round the edges; venter yellow, shortly pubescent. *Legs* wholly yellow, except a broad brown ring on distal half of hind femora, and the blackish hind metatarsus. *Wings* clear, stigmatic area pale yellow; halteres deep yellow.

Length, 3 mm.

Described from two ♀ ♀ in good condition in the Indian Museum, from Margherita, Assam, and Paresnath, Chota Nagpur, 4400 ft., v. 1909 (*Dr. Jenkins*).

Subfamily BERINÆ.

Head semicircular; eyes large and prominent, bare or hairy; antennæ with 3rd joint moderately elongate and more or less cylindrical, but not conspicuously so, with eight annulations and no apical style or arista. *Thorax* roughly oblong; scutellum generally with four or six marginal spines, occasionally eight, and in individuals an odd number may occur; pubescence of thorax continued over spines. *Abdomen* with at least seven obvious segments, longer than thorax, dorsum flattened, sides approximately parallel. *Legs* simple, moderately strong; 1st joint of hind tarsi generally dilated in ♂; spurs on middle tibiæ in rare cases.* *Wings* not of the normal Stratiomyid type, all the veins, except an occasionally obviously abortive one, running out to wing-margin; 2nd vein short, beginning opposite base of discal cell, ending near tip of 1st; 3rd vein forked, both branches ending before wing-tip; 4th vein with only two terminations (as in PACHYGASTRINÆ), as the 5th vein forms the hinder side of the discal cell; posterior cross-vein therefore absent; anal cell closed at some distance from wing-border; squamæ small.

This subfamily is easily distinguished from all others except XYLOMYINÆ by the 7-segmented abdomen and by the anterior veins not being crowded together; whilst from the XYLOMYINÆ it is separated by the 2nd vein (præfurca) originating opposite the base of the discal cell instead of at some considerable distance before it, also by the open 4th posterior cell. Their usually

* *Acanthomyia*, for instance, a European genus.

æneous or metallic colour also renders them conspicuous, and though in this they resemble the SARGINÆ, the latter are always easily known by the anterior cross-vein connecting the discal cell with the præfurca instead of with the 3rd vein. The frequently dilated hind metatarsus in the ♂ is a further character of the BERINÆ.

The life-histories of a few European species are known, but not that of *Beris*. That of *Chorisops tibialis* has been described by Handlirsch. The larvæ live in the earth and decaying matter.

Table of Genera.

Scutellum unspined	ALLOGNOSTA, Ost.-Sack., p. 93.
Scutellum spined.	
Palpi minute or obsolete; eyes contiguous in ♂	BERIS, Latr., p. 90.
Palpi rather long; eyes not contiguous in ♂	CHORISOPS, Rond., p. 92.

Genus **BERIS**, *Latr.*

Beris, Latreille, Hist. Nat. Crust. Ins. iii, p. 447 (1802).
Oplacantha, Rondani, Arch. Zool. Modena, iii, p. 87 (1863).
Hexacantha, Lioy, Atti Ist. Ven. (3) ix, p. 586 (1864).
Octacantha, Lioy, *loc. cit.*

GENOTYPE, *Musca chalybeata*, Forst., as *Stratiomys 6-dentata*, F. (Europe); by original designation.

Head almost semicircular, transverse, as broad as thorax; face short, pubescent; eyes large, contiguous in ♂ (with rare exceptions), wide apart in ♀, densely hairy in ♂, upper facets larger than lower, less hairy in ♀ with all equal facets. Proboscis well developed, palpi rudimentary. Antennæ porrect, nearly as long as head; two basal joints short, subequal, bristly; 3rd elongate with eight annulations, the first and last being the longest. *Thorax* rather arched, closely pubescent in ♂, less so in ♀; scutellum with four to eight spines bearing pubescence (occasionally an odd number in individuals). *Abdomen* hardly broader than thorax, flattened, sides nearly parallel, at least 7-segmented; genitalia more developed than in the other subfamilies. *Legs* simple, of moderate size; hind metatarsus dilated in ♂ and elongate in both sexes. *Wings* longer than abdomen, not of the typical Stratiomyid nature; anterior veins not crowded together, all veins distinct and generally reaching wing-margin; 2nd vein rather short, enclosing the conspicuous large dark stigma; 3rd vein rather widely forked, both branches ending before wing-tip; 4th vein with only two terminations and occasionally an abortive third; posterior cross-vein absent as upper branch of 5th vein forms hinder side of discal cell; anal cell closed at some distance from border of wing. Alar squamæ of moderate size; thoracic ones undeveloped.

Range. Europe, Orient, Australia, North and South America.

Life-history. The European *B. chalybeata* has been bred from moss, but the metamorphoses of the genus are not well known. The perfect insects prefer marshy situations, but are generally distributed. Col. Yerbury records the males of some British species as performing a rather wild aerial dance.

The two Indian species of *Beris* are easily distinguished:—

Legs mainly dark brown .... *geniculata*, Curt.
Legs yellow; femora and hind tibiæ with brown bands. *annulipes*, Brun.

60. Beris geniculata, *Curt.*

Beris geniculata, Curtis, Brit. Ent. viii, p. 337 (1830).

♂ ♀ *Head*: frons in ♂ rather large, shining black, with a depressed median channel on upper part; face and lower part of head shining black; frons and face with rather dense blackish-brown pubescence; vertex wholly occupied by the considerably elevated ocellar triangle, bearing blackish-brown hairs; proboscis black, labella orange, palpi black; eyes contiguous for a considerable distance, with dense blackish-brown pubescence on front part, less dense on rest of surface, facets of upper half much larger than the others; antennæ black; 3rd joint not quite twice as long as the 1st and 2nd put together,* greyish on inner side about the middle, tapering to tip after about 3rd or 4th annulation, extreme tip with two or three minute bristles. In ♀, frons nearly one-third of head, shining black, as is the face, both with short pale pubescence; eyes with very short pubescence. *Thorax* and scutellum metallic shining green or blue-green, the former distinctly punctate except towards hind margin; scutellum impunctate; both with rather dense blackish pubescence, which is less dense on scutellum; the latter with eight shining green spines (normally in European specimens only six). In the ♀, pubescence on dorsum of thorax pale and short, rather depressed. *Abdomen* very dark brown, nearly black, with rather long pubescence towards sides, which is brownish in ♂, pale yellowish and much shorter in ♀; venter shining brown; genitalia rather small. *Legs* very dark brown, tips of femora narrowly orange; base of tibiæ orange to about one-third on anterior legs and to a quarter on hind pair; anterior metatarsi pale, rest of tarsi black, hind metatarsi pale, considerably and equally dilated throughout their length except at base and tips, longer than four remaining joints together, the latter black. *Wings* brown, costal cell a little paler; stigma large, dark brown, oval; in ♀ wings clearer; halteres brownish orange.

Length, 4–5 mm.

* A slight error as to the length of the 3rd antennal joint seems to have crept into Verrall's usually scrupulously correct writings, as he contradicts himself in the table of species and the description. The discrepancy may not be important.

Described from a ♂ and two ♀ ♀ in the Indian Museum taken by me at Darjiling, 6900 ft., 2. x. 1908.

Whether this species is the true *B. geniculata* of Curtis is not quite certain, as though it agrees in practically all other points, the difference in the width of the frons in the ♀ is important: less than one-fourth the width of the head in true *geniculata* and nearly one-third in the present form. My specimens are also distinctly a size smaller, 4-5 mm. against about 6. *B. geniculata*, Curt., is recorded from Central and Southern Europe.

61. **Beris annulipes**, *Brun.*

Beris annulipes, Brunetti, Rec. Ind. Mus. vii, p. 455 (1912).

♀. *Head* with frons nearly one-fourth the width of the head; brilliantly shining, dark blue, uniformly wide; occiput shining black, with a little grey hair on posterior ocular orbits; eyes very shortly but distinctly pubescent; proboscis reddish yellow. Antennæ with first two joints black, with bristly hairs; 3rd joint yellowish on basal, black on apical half; a little grey hair about the base of the antennæ. *Thorax* brilliantly shining violet-blue, with yellow pubescence on dorsum; scutellum brilliantly shining peacock (greenish) blue, with six strong equidistant shining darker green spines on hind margin. *Abdomen* violet, moderately shining, sides with brownish yellow pubescence; venter darker, with short yellow hairs. *Legs* yellow; tips of anterior femora with an indistinct brown band; hind femora and tibiæ with a distinct broad brown apical band on each; tarsi marked extensively with brown. *Wings* grey, upper part (except costal cell), as far hindwards as to include the anterior basal and first posterior cells, brown; halteres yellow.

Length, 6½ mm.

Described from one example taken by me at Darjiling, 7000 ft., 27. v. 1910; in the Indian Museum.

Genus **CHORISOPS**, *Rond.*

Chorisops, Rondani, Dipt. Ital. Prod. i, p. 173 (1856).
Chlorisops, Brauer, Denks. Ak. Wien, xliv, p. 72 (1882).

GENOTYPE, *Beris tibialis*, Mg.; by original designation.

Differing from *Beris* by the palpi being elongate, as long as proboscis, and the eyes in the ♂ distinctly though rather narrowly separated. Eyes bare in both sexes. Scutellum with four yellowish spines. Genitalia in ♂ very protruding. Hind tibiæ incrassated after the base, especially in ♂ Wings with 3rd vein more shortly forked; 4th vein with an abortive 3rd termination; lower branch of 5th vein much curved, closing anal cell far before the wing-border; stigma very distinct.

Range. Europe, India, Chile.

Life-history. The metamorphoses of *C. tibialis* have been well described by Handlirsch.*

62. **Chorisops tibialis**, *Mg.*

Beris tibialis, Meigen, Syst. Beschr. ii, p. 3, pl. xii, fig. 8 (1820).
Chorisops tibialis, Brunetti, Rec. Ind. Mus. vii, p. 456 (1912).
Actina hyaliventris, A. Costa, Il Giamb. Vico Napoli, ii, p. 455 (1857).

♂ ♀ *Head*: frons shining in ♂, blue-black or dark green, one-eighth width of head at vertex, narrowing to half that width on lower half; in ♀ about one-fifth of head at vertex, slightly narrowing downwards, greenish black; vertex with black hairs, frons with pale pubescence; face shining white; proboscis dull orange, palpi yellowish, porrect, distinct; eyes bare, facets all equal. Antennæ rather longer than head (longer still in ♀), brownish black, pale below towards base, variable; 3rd joint 8-annulated. *Thorax* and scutellum brilliant shining green, finely punctate, with fine yellow pubescence; pleuræ with pale pubescence, middle part of mesopleura bare; scutellar spines yellow, with a long apical hair (besides other hairs); humeri yellowish in ♀ *Abdomen* black, moderately shining, more or less yellowish on the disc (especially in the ♀), including generally the greater part of the 3rd and 4th segments; pubescence short and dark; pale yellow at sides down to 4th segment; venter more yellowish than dorsum; genitalia very distinct, and protruding, connected with last abdominal segment by a short neck. *Legs* yellow to dull orange; tarsi blackish from tip of 1st joint; hind femora brownish yellow, variable; hind tibiæ mainly blackish brown, considerably incrassated after the base; hind tarsi rather short, 1st joint incrassate, as long as remaining joints together; pubescence of legs pale yellow; ♀ with legs paler than in the ♂ *Wings* with a faint brown suffusion; stigma large, dark brown, sometimes paler in ♀; halteres yellow, with large knobs.

Length, 6 mm.

The above description is abridged from Verrall.†

Binsar, Kumaon Distr., W Himalayas, 28, v. 1912 (*Dr. A. D. Imms*).

Genus **ALLOGNOSTA**, *O. S.*

Allognosta, Osten-Sacken, Berl. Ent. Zeits. xxvii, p. 297 (1883).
Metoponia, Loew (nec Macq.), Dipt.-Faun. Südafr. i, p. 1 (1860).

GENOTYPE, *Beris fuscitarsis*, Say; by designation of Coquillett, 1910.

♂ ♀ *Head* transverse, rather flattened, as broad as thorax; eyes contiguous in ♂; frons in ♀ rather prominent, convex (in *assamensis*), between one-third and one-fourth width of head. Antennæ set at middle of head in profile; scapal joints subequal,

* Verh. zool.-bot. Ges. Wien, xxxiii, p. 243 (1883).
† British Flies, Stratiomyidæ, &c., v, p. 214 (1909).

cylindrical, 3rd with eight annulations, 1st the largest, about as large as 2nd scapal joint, remainder annular, slightly narrowing in width towards tip. Proboscis and palpi short, latter not extending beyond epistoma. *Thorax* subquadrate, corners rather angular, rather broader behind. Scutellum fully semicircular, convex, unarmed. *Abdomen* longer and slightly wider than thorax, ovate, with tip rather pointed, 8-segmented; genitalia small. *Legs* simple, moderately long and strong. *Wings* with normal Berid venation; 2nd vein rather sharply upturned towards tip; anterior branch of 3rd vein nearly erect; only three endings to 4th vein; discal cell large, hexagonal; anterior cross-vein just beyond base, posterior cross-vein at about the middle; anal cell large, closed a long way before border.

Range. Europe, India, America.

No previous description of the genus appears to have been given. Loew placed certain new species in what he took to be *Metoponia*, Macq., but Osten-Sacken in pointing out his mistake merely renamed *Metoponia*, Lw., as *Allognosta*, without characterising it, as he had no specimens available of the genus at the time. *

In *A. vagans* the legs are all black except at the knees; in *A. assamensis* the anterior femora and middle tibiæ are yellow.

63. **Allognosta vagans,** *Lw.* (Pl. I, figs. 25, 26.)

Metoponia vagans, Loew, Besch. Europ. Dipt. iii, p. 71 (1873).
Allognosta inermis, Brunetti, Rec. Ind. Mus. vii, p. 455 (1912).

♂ *Head* with vertex very small, occupied by the three ocelli; eyes with uniform, very small facets, bare, contiguous; frons an equilateral triangle, moderately large, blackish seen from above, but with grey reflections viewed from other directions; occiput blackish. Antennæ black, normal, as in *Beris*; the 3rd joint with seven annular impressions, appearing as if composed of eight closely compressed joints. Palpi and proboscis black; the underside of the large labella yellowish. *Thorax* and scutellum blackish, with a slight æneous tinge, microscopically roughened, and with microscopic yellow hairs; the anterior margin and shoulders with a very little short yellowish hair, which extends also over the pleuræ to some extent. Scutellum unspined, with microscopic yellow hairs. *Abdomen* dull black, barely shining, the sides with very short yellow hairs; venter similar, with very minute yellow hairs. Genitalia consisting of a pair of blackish, fairly thick claspers, each with a small narrow appendage; there being also an upper pair of yellow, hairy, finger-like appendages. *Legs* black, the knees distinctly but not broadly yellowish brown; pulvilli pale yellowish. *Wings* blackish brown; stigma large, well defined, brown; halteres black.

* As to the supposed identity of *Metoponia*, Macq., and *Metoponia*, Lw., see Brunetti, Rec. Ind. Mus. vii, p. 455.

Length, 4½ mm.

Described from a unique ♂ in the Indian Museum taken by me at Darjiling, 7000 ft., 29. v. 1910. I found the species not uncommon at Hankow, China, 22–26. iv. 1906.

64. **Allognosta assamensis**, sp. nov.

♀ *Head* as broad as thorax; frons very retreating, slightly swollen on upper corners, where it projects above eyes in profile, forming half width of head, black, shining, parallel-sided, closely punctulate, and with almost microscopic brownish pubescence; lower part smooth, vertical triangle small and low; ocelli inconspicuous; face as broad as frons, sides parallel, shining black, bare; two large, dull grey tomentose spots placed diagonally just below base of antennæ, their upper corners nearly touching; proboscis brownish black, palpi black, rather long; occiput black; eyes bare, small, only a little over half height of head; posterior orbits on upper half only, rapidly diminishing and disappearing at about middle of eye. Antennæ placed below middle of head in profile; first two joints subequal, cylindrical, pale yellow; 3rd with eight annulations, 1st annulation broadest and longest; basal part of flagellum brownish yellow, gradually becoming blackish at tip. *Thorax* subquadrate, barely wider behind, front corners rather angular, hind corners cut away by the very distinct brown posterior calli; dorsum thickly punctulate, with very short soft yellowish-brown pubescence; the moderate-sized semicircular scutellum and the pleuræ similarly clothed, black; a broad yellowish-white stripe on upper part of latter from anterior margin to wing-base; metanotum small, dull brown. *Abdomen* 8-segmented, practically bare; 1st and 2nd segments almost coalescent, 6th distinctly narrower than 5th, and the 7th and 8th narrower than 6th; all blackish brown, or even slightly violet-tinged; middle half of 1st, 2nd, and 3rd yellowish (the pale part probably variable in extent); venter mainly yellowish, but blackish at sides and tip. *Legs* mainly yellow; apical three-fourths of front tibiæ and all front tarsi, last three joints of middle tarsi, apical half of hind femora, hind tibiæ (except narrowly at base), and last two joints of hind tarsi black. *Wings* pale smoke-grey, a very little darker at tip; stigma large, black, conspicuous, clearly demarcated and filling all marginal cell except extreme tip, which is slightly yellowish, as is also the costa for a very short distance at this point; 1st submarginal cell practically clear, except at the very narrow base and extreme tip, thus in striking contrast to the dark contiguous stigma; extreme base of wing clear; 5th and 6th veins yellow, remainder dark brown; halteres with stem yellowish white, clubs large, oval, black.

Length barely 5 mm.

Described from a single ♀ in the Indian Museum from above Tura, Garo Hills, Assam, 3500–3900 ft., viii. 1917 (*Kemp*).

Subfamily XYLOMYINÆ.

Head with eyes separated in both sexex; face depressed in middle; palpi elongate and upturned; antennal 3rd joint elongate, with eight annulations and generally a minute apical bristle. *Thorax* practically bare, subquadrate; scutellum unspined. *Abdomen* of 7 to 9 segments, elongate, longer than thorax, with nearly parallel sides; genitalia of ♂ conspicuous. *Legs* moderately long and stout, bare or nearly so, hind femora often incrassate or spinose below; posterior tibiæ with two spurs. *Wings* not of the normal Stratiomyid type, all the veins reaching wing-margin, the anterior veins not crowded together; 2nd vein (præfurca) originating some distance before base of discal cell, the latter much more elongate than in any other subfamily; costal vein complete, ambient vein present for at least some further distance; 3rd vein with an elongate fork, lower branch ending at about wing-tip; 4th vein with three terminations; 4th posterior cell closed near wing-border, a special character of this subfamily; five posterior cells; posterior cross-vein normally present, but in some species the contact of upper branch of 5th vein with discal cell is practically punctiform, in which case cross-vein absent; alar squamæ very small, thoracic squamæ absent.

The XYLOMYINÆ resemble the BERINÆ more than any other subfamily, and the principal distinguishing characters are given under BERINÆ. Further characters of the XYLOMYINÆ are the depressed face, the much more elongate discal cell, the unspined scutellum, the non-metallic or æneous nature of the species, and the undilated metatarsus in the ♂ They are mostly yellow, somewhat *Ichneumon*-like flies, and sparsely pubescent.

Genus **XYLOMYIA**, *Rond.*

Xylomya, Rondani, Dipt. Ital. Prod. iv, p. 11 (1861).
Subula, Megerle in Meigen, Syst. Besch. ii, p. 15 (1820).
Solva, Walker, Proc. Linn. Soc. Lond. iv, p. 98 (1860).
Macroceromys, Bigot, Bull. Soc. Ent. France, (5) vii, p. lxxiii (1877).
Subulaomyia, Williston, Man. N. Amer. Dipt. p. 43 (1896).
Xylomyia, de Meijere, Tijd. v. Ent. i, p. 217 (1907).

GENOTYPE, *Xylomyia* is a nom. nov. for *Subula*, Mg., of which Rondani gave *varia*, Meg. in Mg., as type.

Head transverse, as wide as thorax; frons flush with eyes or slightly depressed; face distinctly depressed about the middle;

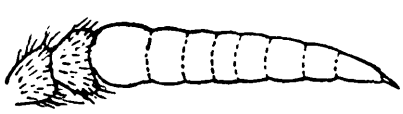

Fig. 7.—*Xylomyia*, antenna.

eyes bare, well separated in ♂, still more so in ♀; proboscis prominent; palpi 2-jointed, cylindrical, rather long, directed upwards. Antennæ elongate, as long as or longer than head; first

two joints short, subequal, 3rd with eight annulations and usually a very small apical bristle. *Thorax* oval and subquadrate, slightly arched; scutellum unspined. *Abdomen* longer than thorax and about as wide, 7-segmented; genitalia distinct. *Legs* rather long, simple, except for the slight incrassation of the femora, especially the hind pair, which are considerably thickened in some species and often with a row of small spines on underside; posterior tibiæ with two spurs. *Wings* longer than abdomen, not of the normal Stratiomyid type; veins not crowded together anteriorly, all distinct and attaining wing-margin; costal vein reaching wing-tip; ambient vein present for some distance; 2nd vein beginning distinctly before base of discal cell, 3rd vein originating shortly after, the fork elongate, the lower branch ending at wing-tip; discal cell much more elongate than in any other subfamily; 4th vein with three terminations, the lowest one closing the 4th posterior cell at wing-border; posterior cross-vein very short or absent; anal cell closed distinctly but not considerably before wing-border; alar squamæ small, thoracic pair absent.

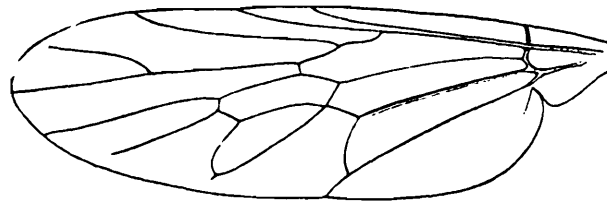

Fig. 8.—*Xylomyia*, wing.

Range. Europe, the Orient, North, Central, and South America, Canary Isles, and Natal.

Life-history. Larva amphipneustic (though Lundbeck doubts if it is truly so), broad, brown, leathery, with parallel sides, upper and lower surfaces with bristles placed transversely on segments, 12-segmented, including head, which is broadly conical; mouth-parts normally Stratiomyid; last body-segment semicircular; orifice of respiratory chamber forming posterior extremity of body. It lives in old trees or decaying wood.

Xylomyia is a genus of yellow and black, rather *Ichneumon*-like flies, with considerable outward resemblance to *Xylophagus* (LEPTIDÆ), but the closed 4th posterior cell will easily distinguish them. The species seem to be much rarer in the adult than in the larval stage. *Solva*, Walker, antedates *Xylomyia* by one year, but as the subfamily name is constructed from the latter it should be retained.

Table of Species.

Legs practically wholly yellow; length, 4 mm. .. *flavipes*, Dol.
Legs with distinct dark bands or markings; length, 9–11 mm.
  Hind tibiæ yellow, tips broadly black; length, 9 mm. .. .. *calopodata*, Big.
  Hind tibiæ black, upperside pale at base; length, 11 mm. *nigricornis*, sp. nov

65. **Xylomyia flavipes**, *Dol.*

Subula flavipes, Doleschall, Nat. Tijd. Ned. Ind. xvii, p. 85 (1858).
Xylomyia flavipes, Brunetti, Rec. Ind. Mus. i, p. 87 (1907).

Head with frons one-sixth width of head, barely wider on lower part than at vertex, black, with a little bright yellow pubescence and some whitish pubescence just above antennæ; face black, with a little whitish pubescence, more conspicuous near eye-margins; occiput black, practically bare; antennæ and palpi wholly orange-yellow. *Thorax* black, dorsum and pleuræ with very short yellow pubescence, minutely punctulate; humeri and a ridge thence to wing-base, also the scutellum bright yellow. *Abdomen* yellow, punctulate like thorax; a large dark blackish-brown spot on each segment, leaving only the sides and hind margin of each narrowly pale; genitalia very small; venter much as dorsum, but the yellow of greater extent. *Legs* yellow, extreme tip of underside of hind femora very dark brown. *Wings* nearly clear; venation normal, veins brown; halteres yellow.

Length, 4 mm.

Described from several specimens in the Pusa collection from Chapra, Bengal (*Mackenzie*).

66. **Xylomyia calopodata**, *Big.*

Subula calopodata, Bigot, Ann. Soc. Ent. France, (5) ix, p. 195 (1879).
Xylomyia calopodata, Brunetti, Rec. Ind. Mus. i, p. 87 (1907).

Head with frons above antennæ one-fourth width of head, a little narrower at vertex, black, with grey or yellowish grey pubescence; ocellar triangle slightly elevated, rather large, black; ocelli yellowish; face apparently dark, with a little whitish pubescence; labella very large, dark reddish brown; palpi very large and prominent, sharply upturned, hiding all the face, bright yellow; occiput dark, grey-dusted, with a fringe of whitish pubescence, which dies away on upper margin and is longest on lower part; antennæ dark brown, underside, especially on basal half, yellowish. *Thorax* black, slightly shining, closely punctulate, with minute black bristles and very short yellowish-grey pubescence, which also covers the greater part of the pleuræ; humeri prominent, bright yellow, with a ridge thence to wing-base; scutellum yellowish; metanotum black. *Abdomen* black, slightly shining: closely punctulate, with minute black bristles and soft short yellow pubescence; hind margin of each segment except 1st narrowly but distinctly yellow, bare and shining; venter similar; genitalia rather small. *Legs* bright yellow, with microscopic pale pubescence, tips of femora (and for a rather greater distance on underside) also very narrowly at base, tips of hind tibiæ broadly, anterior tarsi on apical half, and hind tarsi entirely black. *Wings*

clear, highly iridescent; venation normal, veins dark brown; halteres yellow.

Length, 9 mm.

Described from a single specimen in the Indian Museum, from Naini Tal, W Himalayas, 6000 ft., 5. vi. 1909; a second specimen from Shillong, 5000 ft. (*Fletcher*).

67. **Xylomyia nigricornis**, sp. nov.

♀ *Head* with frons gradually widening from vertex to above antennæ, where it is barely one-fifth the width of the head, wholly covered with yellowish pubescence, except immediately above antennæ, where the pubescence is yellowish white; vertex dark grey tomentose, with golden-yellow pubescence; ocelli not very conspicuous; face with nearly parallel sides, fractionally wider than lower part of frons, black, with greyish or yellowish grey pubescence; inner margin of eye slightly cut away a little above antennæ, at a spot where there is a peculiar and conspicuous shining, black, smooth, elongate, triangular space devoid of facets; antennæ blackish brown, a little pale about inner and under side of 2nd scapal and 1st flagellar joints; proboscis orange-brown; palpi bright lemon-yellow, very large and erect, nearly hiding the face; occiput grey-tomentose, with some golden-yellow hairs on margin, and longer ones just behind vertex. *Thorax* black, thickly punctulate, with black bristles; seen from the front only there are three longitudinal stripes of almost microscopic golden-yellow pubescence; humeri conspicuous, bright yellow, a thin dull yellow line thence to wing-base; hind corners of dorsum margined with brown; pleuræ black, closely punctulate, with black bristles and very short whitish pubescence; scutellum bright lemon-yellow, with lemon-yellow bristles, the base narrowly black; metanotum black. *Abdomen* distinctly 7-segmented, 1st and 2nd scarcely separable except by the fringe of hairs on hind border of 1st; 1st segment orange-yellow, hind border broadly black: 2nd orange-yellow, with a large round black spot in middle just clear of the margins, hind margin yellowish white; rest of segments black, hind margin of 3rd to 6th inclusive yellowish white, clearly demarcated; sides of very small 7th segment yellowish; all the black parts of abdomen closely punctulate, with minute black bristles, the yellow parts with short pale yellow hairs; genitalia very small, a pair of small brownish-yellow lamellæ; a little pale, rather long pubescence at sides of 1st segment, and shorter similar pubescence on sides of whole abdomen; venter black, 2nd segment and hind margins of remainder yellowish. *Legs* mainly yellow; hind coxæ (except a patch on hinder side), hind trochanters, underside of hind femora narrowly, inner and outer sides of same towards base (the colour almost united on upper side), also extreme tips, black; anterior tarsi brownish black; hind tibiæ and tarsi black, except upper side of former at base. *Wings* uniformly yellowish grey;

stigma small, brownish; 4th posterior cell closed distinctly but shortly before wing-border; halteres brownish yellow.

Length, 11 mm.

Described from a unique perfect ♀ in the Indian Museum, from above Tura, Garo Hills, Assam, 3900 ft., viii. 1917 (*Kemp*).

Family LEPTIDÆ.

Head semicircular, short, rather flattened in front, as broad as or narrower than thorax; frons at vertex nearly level with the eyes; face short, "usually with a socketed middle part (epistoma) on which there is usually a rounded raised tubercle" (*Verrall*); cheeks more conspicuous in some genera than others. Eyes bare (except in one non-Indian genus *Cœnomyia* and in *Cœnomyiodes*, gen. nov.); contiguous or subcontiguous in ♂, distinctly, sometimes widely separated in the ♀; in a few cases the frons of about equal width in both sexes; upper facets in ♂ often much larger than lower ones; the eyes in life in some species brilliant green; three ocelli. Proboscis generally robust, sometimes very large, though short; labella prominent; palpi moderately long, slender. Antennæ very variable; in the typical LEPTIDÆ with 3rd joint simple, short-conical, round, or reniform, with a bristle or style which is usually terminal, but in some genera is dorsal;* third joint flagelliform and annulated in XYLOPHAGINÆ. *Thorax* a little longer than the head, roughly oval or oblong, with rounded corners, generally widest at the middle; scutellum moderately large, rounded or semicircular; metanotum larger and more conspicuous in XYLOPHAGINÆ than in most LEPTINÆ. *Abdomen* 7-segmented, elongate or conical, longest and nearly cylindrical in some ♂ XYLOPHAGINÆ. *Legs* rather long and slender, often minutely bristly on the tibiæ or below the femora; front coxæ rather elongate; fore tibiæ with or without a single spur, middle tibiæ always with two spurs, hind tibiæ always with one or two spurs, exceptions being rare; pulvilli three, empodium pad-like. *Wings* glabrous, but minutely pubescent under high microscopic power, somewhat broad, with more or less rounded tips. Auxiliary and 1st longitudinal vein somewhat approximate, always ending beyond middle of wing; 2nd longitudinal beginning at from one-third to one-half the length of the wing, ending not far beyond tip of 1st, often dipped towards tip to embrace the generally obvious stigma; 3rd vein begins a little beyond the 2nd, (almost always) practically in a line with the base of the discal cell; always forked, the fork varying in length † and in width of

* Williston figures the antennæ of *Atherix* with the arista absolutely *basal*; Verrall evidently claims the most distant point horizontally as the true tip and considers the 3rd joint produced downwards. Most authors, I believe, regard as the tip the extremity of its greatest length, as I do here; it can be accepted either way, but misunderstandings may arise.

† It is long and narrow in *Symphoromyia*, and short and wide open in *Hilarimorpha*, neither of these genera being Oriental.

opening, but always embracing the wing-tip.* Discal cell always present, except in *Hilarimorpha* (non-Oriental); anterior cross-vein near basal end of discal cell, always before its middle; 4th longitudinal with anterior branch forked, lower branch simple; posterior cross-vein nearly opposite anterior cross-vein; 5th longitudinal forked at about its middle, the upper branch more or less curved or angled at the point where it meets the posterior cross-vein; 6th vein complete. Two submarginal cells, 5 posterior cells; anal cell open or closed; alulæ of moderate size, generally well developed, absent in XYLOPHAGINÆ; alar squamæ rather small, thoracic squamæ absent, "but the frenum distinct and developing a rather broadened membrane near the angle;" halteres distinct, stem rather long.

The whole body in LEPTIDÆ is usually clothed with soft pubescence, microscopically so on the often apparently bare legs. There are no bristles of a chætotactic nature, though a few short ones or bristly hairs often occur about the thorax, wing-roots, and metapleuræ.

Life-history. The metamorphoses of many European species are more or less known.† Larva amphipneustic, with parchment-like skin, generally living under bark, in moss, or earthy matter, predaceous on Coleopterous larvæ and other soft-wood insects, though some are aquatic. Twelve-segmented, including head, which is exserted though small, long, pointed, the mouth-parts very small; the three thoracic segments with strongly chitinized dorsal areas, the prothoracic segment also hardened beneath; last segment with a strongly chitinized area on hinder part, with two strong hooks, this area also bearing two spiracles. Abdominal segments often with transverse swellings on lower surface, locomotion being effected by means of these, which take the form of roughened intercalated spaces between the segments, though Brauer affirms that true pseudopods exist in *Atherix*.

The perfect insects are found usually in open woods and the meadow-lands in their vicinity, or in marshy and soft places, being fond of resting on tree-trunks.

With the exception of one or two North-American biting species of *Symphoromyia*, which bite like TABANIDÆ, the LEPTIDÆ are harmless to mankind.‡

The LEPTIDÆ are rather closely allied to both the STRATIOMYIDÆ and the TABANIDÆ, but the former are easily known by the crowding of the venation on the front part of the wing (except in BERINÆ) and by the shape of the discal cell, which is always small, and seldom much longer than wide (except in *Xylomyia*), at

* In one or two European species of *Xylophagus*, the lower branch of the 3rd vein may in individual specimens occasionally end barely above the wing-tip.

† *Atherix ibis*, *Xylophagus ater*, *Leptis tringaria*, *L. scolopacea*, etc.

‡ [Five species of blood-sucking Leptids have been described by White and Ferguson from Australia and Tasmania, all belonging to the genus *Spaniopsis*, White; *Trichopalpus obscurus*, Phil., has been noted as a greedy blood-sucker in Chile, and *Leptis scolopacea*, L., and *L. strigosa*, Mg., have been recorded as biting man in France.—ED.]

most about one and a half times. In LEPTIDÆ the discal cell is distinctly oblong and always more than twice as long as wide. The only two genera about which doubt might arise would be *Xylophagus* and *Xylomyia*.* The TABANIDÆ, though possessing the same venation as the LEPTIDÆ, may at once be recognized by the characteristic antennæ and their more robust structure throughout.

Table of Subfamilies.

1. Third antennal joint flagelliform, more or less elongate, annulated, without arista ..	2.
Third antennal joint not flagelliform, short, or but little elongated, rounded, conical, or reniform, never distinctly annulated; arista always present.	4.
2. All tibiæ with spurs	3.
Front tibiæ without spurs	ARTHROCERATINÆ.
3. The 5th posterior cell in broad contact with discal cell; face with rounded socketed epistoma, margined by broad side-cheeks; eyes in ♂ contiguous; scutellum with two short blunt spines	CŒNOMYINÆ.
The 5th posterior cell not touching discal cell; face flat, epistoma not socketed or margined by broad side-cheeks; eyes in ♂ well separated; scutellum unarmed...	XYLOPHAGINÆ.
4. Eyes in ♂ wide apart; 3rd vein widely forked at much beyond half its length; face not at all socketed	VERMILEONINÆ.
Eyes in ♂ contiguous; 3rd vein less widely forked before, or at latest at, half its length; face with rounded socketed epistoma	LEPTINÆ.

In few families of Diptera is there such diversity of opinion with regard to the subfamilies as in the present one. Prof. Kertész, in his 'Catalogue of Diptera,' admits none at all, but ranks XYLOPHAGIDÆ (including *Xylomyia* and CŒNOMYIDÆ) as separate families. Verrall recognises the four last subfamilies presented here with CHRYSOPILINÆ as a fifth; Williston divides the LEPTIDÆ into three (dealing with North-American species only), XYLOPHAGINÆ (including *Cœnomyia*), ARTHROCERATINÆ (including *Xylomyia*), and LEPTINÆ. Beling has shown the affinity between *Cœnomyia* and *Xylophagus* in their larval stages.

Verrall divides the XYLOPHAGINÆ and VERMILEONINÆ, taken together, from the CŒNOMYINÆ and LEPTINÆ (with CHRYSOPILINÆ as an additional subfamily), taken together, by the characters of the face, afterwards distinguishing those of each group from one another by antennal characters; but the system herein presented is adopted on account of less indecision being likely to arise as to the nature of the antennæ than the degree of prominence of the face

The ARTHROCERATINÆ as a subfamily are rather difficult for me to judge personally, since no example is available for actual

* See XYLOPHAGINÆ (p. 104) and *Xylomyia* (p. 96) respectively.

examination, except two genera of my own that I have attributed to it. Williston admits the subfamily, but includes *Xylomyia*, which is essentially a Stratiomyid; whilst *Glutops*, the only other North-American genus, except *Arthroceras* itself, has given rise to some discussion as to its exact position.

The CŒNOMYINÆ are large, heavy, rather bare, and Tabanid-like flies with comparatively short legs.

The VERMILEONINÆ are not Oriental, so only a passing note need be given them here. They differ from the LEPTINÆ by the eyes being wide apart in both sexes, by a different structure of the face, and, to a less extent, the body. The 3rd longitudinal vein forks later and more widely, and the wings are cuneiform at their bases, without alulæ; the venation, though technically normal, shows minor variations.

Table of Indian Subfamilies and Genera.

1. Antennæ palpably elongate; 3rd antennal joint distinctly annulated; no arista . 2.
   Antennæ not palpably elongate; 3rd antennal joint never annulated, but rounded, conical, or reniform; arista present. (LEPTINÆ.). 5.
2. All tibiæ spurred; 3rd antennal joint without style . ... 3.
   Fore tibiæ without spurs; 3rd antennal joint with a style-like prolongation (absent in *Pararthropeas*). (ARTHROCERATINÆ.) .. 4.
3. Fifth posterior cell in broad contact with discal cell; face with rounded socketed epistoma margined by broad side-cheeks; eyes in ♂ contiguous; scutellum with two short blunt spines. (CŒNOMYINÆ.) .. CŒNOMYIODES, gen. [nov., p. 110.
   Fifth posterior cell not touching discal cell; face flat, epistoma not socketed or margined by broad side-cheeks; eyes in ♂ well separated; scutellum without spines. (XYLOPHAGINÆ.) .. .. RHACHICERUS, Walk., [p. 104.
4. First antennal joint much the longest; 4th posterior cell open . .. ... DESMOMYIA, Brun., [p. 107.
   Third antennal joint more than double as long as 1st and 2nd together; 4th posterior cell closed .... PARARTHROPEAS, gen. [nov., p. 108.
5. Third antennal joint kidney-shaped; arista dorsal, subdorsal, or apical... . .. 6.
   Third antennal joint round, oval, or pointed; arista always apical .. .. . 9.
6. Arista apical; palpi wholly bare, much enlarged, spatulate .... MACELLOPALPUS, Big., [p. 122.
   Arista dorsal or subdorsal; palpi slender, always pubescent, generally bisinuate, more conical and pointed than in *Leptis* and *Chrysopilus* .... 7.
7. Eyes in ♂ separated by about the width of the ocellar tubercle, or actually contiguous for a short distance; in ♀ the frons three times as wide as the ocellar tubercle . 8.

Eyes in ♂ contiguous for a considerable distance; frons in ♀ only as broad as ocellar tubercle	[p. 121. SURAGINA, Walk.,
8. Frons and side-margins of face (♂ ♀) distinctly hairy.	ATHERIX, Mg., p. 120.
Frons in ♂ and side-margins of face (♂ ♀) bare	[p. 112. ATRICHOPS, Verr.,
9. Anal cell open; hind tibiæ with two spurs	LEPTIS, F., p. 124.
Anal cell closed; hind tibiæ with one spur only	[p. 128. CHRYSOPILUS, Macq.,

Subfamily XYLOPHAGINÆ.

Face flat, no socketed epistome margined by broad side-cheeks. Palpi long, curved upwards; the 3rd antennal joint flagelliform, generally divided by annulations into seven parts, but in *Rhachicerus* into many more. Eyes in ♂ distinctly separated, in ♀ rather wider apart. Body and legs almost bare. Scutellum smaller and metanotum more conspicuous than in normal LEPTIDÆ. Abdomen considerably elongated or cylindrical; the male genitalia rather complex, those of the ♀ long and telescopic. All tibiæ spurred. Wings with auxiliary and 1st veins long, 2nd shorter than in LEPTINÆ, 3rd with fork rather short, widely open, lower branch ending above or at wing-tip; anterior cross-vein very short, situated towards base of discal cell; posterior cross-vein exceedingly short or absent, anal cell normally closed at wing-border; axillary vein indistinct or absent; alulæ absent.

Life-history. "Larva amphipneustic, allied to those of CŒNOMYINÆ and LEPTINÆ; carnivorous; living under the bark of dead trees and preying upon other (probably dead) larvæ occurring there, especially those of wood-boring Coleoptera, or upon the debris and detritus left by those larvæ" (*Verrall*). Birch, alder, and pine are the trees mostly favoured. The imagos are usually found about their breeding-places in woods.

Only one genus of this subfamily (*Rhachicerus*) occurs in India. *Xylophagus*, *Xylomyia*, and one or two other genera were for many years regarded as a separate family, but the resemblance between them is more apparent than real; and Osten-Sacken, who very closely criticised Brauer's paper on the characters of the NOTACANTHA (Berl. ent. Zeit. xxvi, p. 363), showed satisfactorily that they (*Xylophagus* and *Xylomyia*) cannot both come in the same ultimate subdivision.

Genus **RHACHICERUS**, *Walk.*

Rhachicerus, Walker, List Dipt. Brit. Mus. v, Supp. i, p. 103 (1854).
? *Rhyphomorpha*, Walker, Proc. Linn. Soc. Lond. v, p. 275 (1861).
Antidoxion, Snellen v. Vollenhoven, Versl. Meded. Kongl. Akad. van Wetensch. Afd. Natuurk. xv, p. 1 (1863).

GENOTYPE, *Rhachicerus fulvicollis*, Walk.; the original species.

"Body slender, nearly linear, cylindrical. Head transverse, nearly as broad as thorax, vertex narrow. Eyes large, with small

facets, deeply notched and including a smooth space on each side by the base of the antennæ. Ocelli approximate. Proboscis not prominent; palpi short. Antennæ with 34 or 35 joints, tapering slightly, much more than half the length of the body, deeply serrated on each side; joints transverse, very short, cyathiform, petiolated. Thorax elongate-quadrate; abdomen pubescent, 8-segmented, hardly tapering from base to tip, about twice as long as thorax. Legs rather slender, moderately long; hind tibiæ with very minute spurs; ungues and onychia very small. Wings narrow."

Range. North and Central America, Cuba, India, Malay Archipelago, and one species in Europe.

Life-history unknown.

Table of Species.

Thorax orange.	*nigricornis*, sp. n., p. 105.
Thorax black.	
Dorsum of first three abdominal segments mainly yellow	*bicolor*, Brun., p. 105.
Dorsum of abdomen all black, except a transverse yellow band on 2nd segment.	*unicincta*, sp. n., p. 106.

68. **Rhachicerus bicolor**, *Brun.*

Rhachicerus bicolor, Brunetti, Rec. Ind. Mus. vii, p. 461 (1912).

♀ *Head* with frons nearly one-third width of head, shining black, bare; three small yellow ocelli at vertex; eyes blackish, bare; proboscis bright yellow, palpi of similar colour, very small; a whitish triangular spot on each side between the eyes and the base of the antennæ. Antennal 1st and 2nd joints black, 2nd with a circlet of black and yellow bristles around its tip; flagellar 1st joint much wider than the rest, which are blackish brown, the comb-like prolongations on the underside bright yellow. (The antennæ being incomplete, the exact number of joints cannot be given.) *Thorax* and scutellum wholly shining black, practically bare; humeri conspicuous, bright yellow. *Abdomen* black, dorsum of first three segments mainly yellow, the borders being black, the 4th segment being more or less yellow in the centre; venter principally yellow on the first three segments, remainder blackish. *Legs* bright yellow, hind coxæ black. *Wings* with venation as in *Xylomyia*, grey, with a hardly perceptible darkening from the costa partly across the wing, and again towards the tip; halteres bright yellow.

Length, 8½ mm.

Described from one ♀ in good condition in my collection from Kandy, v. 1909 (*E. E. Green*).

69. **Rhachicerus nigricornis**, sp. nov. (Pl. II, fig. 1.)

♂ *Head* black; frons at vertex less than one-fourth width of head, widening to one-third at level of antennæ, with some whitish dust around base of antennæ; scape of latter yellow, with short black bristles, flagellum black for 23 joints, with the comb-

like prolongation of each yellowish white, last seven joints (making with scape 32 in all) with their comb wholly yellowish white; proboscis orange-yellow. *Thorax* and *abdomen* orange; a large black spot on pleuræ in front of wing-base and another just behind wing-base; sternopleura shining black; abdomen with 2nd segment much the longest; hind border of each narrowly black, less distinctly so on 5th and 6th segments. *Legs* orange-yellow; hind coxæ shining black; hind femora and tibiæ with basal two-thirds of each black; hind tarsi all black. *Wings* grey, subcostal and marginal cells blackish; halteres yellow.

Length, 9 mm.

Described from a unique ♂ in the Indian Museum from Peshoke Spur, Darjiling, 2000 ft., vi. 1916 (*L. C. Hartless*).

70. **Rhachicerus unicinctus**, sp. nov. (Pl. II, fig. 2.)

♀ Head with frons brilliantly shining black, longitudinally furrowed, at vertex one-third of head, slightly wider just above level of antennæ; face dull black seen from below, but at least upper part brilliantly white seen from above, narrowing towards mouth; proboscis short, thick, bulbous, orange, as are the upturned cylindrical palpi, slightly thickening towards tips; eyes brown; occiput moderately shining black, with a little short brown pubescence towards margins. First two joints of antennæ blackish above, orange below; 3rd with upper side and tips of rays black, the intermediate part of rays orange-yellow; 20 or 21 joints present in flagellum, according to whether the small terminal prolongation is part of the last rayed joint or not; the flattened irregularly-shaped elevation on which the antennæ are placed lemon-yellow. *Thorax* shining black, dorsum finely punctate, with extremely short yellowish pubescence; humeri and mesopleuræ dull shining yellowish; scutellum like thoracic dorsum. *Abdomen* slightly shining black; 1st segment very short; 2nd longest, with a yellowish transverse band of moderate width, of which the hind border lies just in front of middle of segment and is punctuated by a row of small indentations, almost giving the appearance of two segments; 3rd and 4th segments barely narrower than 2nd; 5th rapidly narrowing from base to tip; 6th, 7th, and 8th extremely narrow and very elongate, having a telescopic appearance, the last one possibly forming two segments (making nine in all) in addition to the two pale yellow elongate lamellæ; whole abdomen with sparse short yellowish-white pubescence; venter black, 2nd segment mainly dull yellowish. *Legs* mainly orange-yellow; trochanters, about basal half of femora, and hind tibiæ wholly black. *Wings* yellowish grey, vitreous, stigmatic region a little yellowish brown, a slight infuscation at wing-tip; halteres yellowish.

Length, 8 mm.

Described from one ♀ in the Indian Museum from Peshoke, Darjiling, 1000 ft., 26. v.–14. vi. 1916 (*Gravely*).

Subfamily ARTHROCERATINÆ.

Antennæ obviously elongate, 3rd joint flagelliform, with distinct annulations, arista absent. Front tibiæ without apical spurs.

Only two genera occur in India, and they may be distinguished as follows:—

First antennal joint as long as 2nd and 3rd together; 4th posterior cell open	DESMOMYIA, Brun.
Third antennal joint much more than double as long as 2nd and 3rd together; 4th posterior cell closed	PARARTHROPEAS, [gen. nov.

Genus **DESMOMYIA**, *Brun.*

Desmomyia, Brunetti, Rec. Ind. Mus. vii, p. 462 (1912).

GENOTYPE, *Desmomyia thereviformis*, Brun.; the original species.

Apparently near, but quite distinct in several characters from *Arthroceras*.* Five posterior cells, 4th without any trace of contraction towards wing-border; anal cell closed just before wing-border; remainder of venation in accordance with Williston's figure of the wing of *Arthroceras*.† Antennæ elongate, 1st joint as long as 2nd and 3rd together, cylindrical, 2nd broadly annular, 3rd elongate with an apical style-like prolongation. Eyes contiguous for a considerable distance, bare; three ocelli. Proboscis rather short, stout, cylindrical; palpi elongate, narrow. Face with two dividing furrows below antennæ and rather bulbous cheeks, as in *Arthroceras*. General appearance of whole insect that of a *Thereva*, with soft pubescence on thorax and abdomen, the latter with seven distinct segments. Legs slender, like those of *Thereva*; fore tibiæ unarmed, posterior tibiæ with two distinct pale spurs each.

71. **Desmomyia thereviformis**, *Brun.*

Desmomyia thereviformis, Brunetti, Rec. Ind. Mus. vii, p. 462 (1912).

♂ *Head* with vertex small, dark; occiput of a lighter grey than the dark blackish-grey face; proboscis and palpi blackish grey; the whole head with stiff black hairs; eyes bare. Antennæ dark grey; 1st joint elongate, cylindrical; 2nd broadly annular, half the length of the 1st; the 3rd joint is best described as diamond-shaped, with rounded angles, the greatest breadth being beyond the middle; the tip produced into an elongate narrow style with blunted tip, the style as long as the whole antenna. *Thorax* dark grey above, with three separated, moderately broad, blackish stripes, the outer ones with a tendency to an interruption in front of the middle; sides and scutellum moderately dark grey,

* The description of this genus is not accessible in India.
† 'North-American Diptera' (3rd ed.), p. 161, fig. 18.

with soft pale yellowish-white pubescence. *Abdomen* 7-segmented, 2nd the broadest, dark blackish grey with soft pale yellowish-white pubescence; genitalia small, inconspicuous. *Legs* black; knees and femora more or less brownish yellow at base, the colour on the fore pair extending beyond the middle; hind tibiæ widened towards tips, hind metatarsus distinctly incrassate; the whole of the legs shortly pubescent; anterior tibiæ unarmed, posterior tibiæ with two distinct yellowish spines. *Wings* as in *Leptis*, except that the anal cell is closed just before the border, pale grey; stigma blackish, very elongate; two indistinct pale blackish suffusions, the first, from the origin of the 2nd vein, embracing the anterior cross-vein, the base of the discal cell, and the posterior cross-vein; the second runs from the fork of the 3rd vein to the hinder side of the discal cell, along its outer side; costal cell rather broad, the costa curving outwards slightly; halteres brownish yellow.

Length, 5–6 mm.

Described from two ♂ ♂ in the Indian Museum from Badrinath, Garhwal District, 10,200 ft., 27. v. 1910 (*Dr. A. D. Imms*).

Genus **PARARTHROPEAS**, nov.

GENOTYPE, *Pararthropeas thereviformis*, sp. nov.

Head transverse, as broad as thorax; eyes bare, with very small facets of uniform size (♀); proboscis rather short, thick; palpi as long as proboscis, cylindrical, straight, bare, porrect; frons narrow, with parallel sides; face broader, with nearly parallel sides, not projecting beyond eye-margins; occiput flattened, or slightly concave; antennæ longer than breadth of head, cylindrical, barely appreciably narrower towards tip; 1st and 2nd joints short, bristly; 2nd shorter than 1st, as broad as long; 3rd divided by eight impressed lines into nine annulations of equal length, except the 1st, which is considerably the longest; last joint bluntly pointed, without style. *Thorax* oblong, humeri prominent, nearly bare, with no obvious bristles, minutely pubescent; scutellum transverse, unarmed. *Abdomen* subcylindrical, about twice as long as thorax, slightly flattened, with nearly parallel sides for some distance, gradually narrowing to tip, 7-segmented, the last segment very short. *Legs* of moderate size and strength; hind femora considerably incrassate, with a row of small blunt spines on underside; posterior tibiæ with two spurs, front tibiæ apparently unarmed; tarsi as long as tibiæ, front pair distinctly longer; claws distinct, three pulvilli. *Wings* with auxiliary vein ending at about middle of costa, 1st longitudinal ending a little beyond; 2nd vein beginning at about middle of wing, ending a little beyond 1st vein; 3rd vein beginning shortly after 2nd, forked at half its length, the branches gradually diverging, the lower branch ending at wing-tip; anterior cross-vein near base of discal cell, which is twice as long as broad; 5 posterior cells, 1st gradually widening from base to tip, 2nd and 3rd truncate at

base, 4th closed distinctly before wing-margin; posterior cross-vein present; anal cell closed.

♂ unknown.

Range. Assam.

This genus differs from *Arthropeas*, Lw., by (1) the 1st flagellar joint not being differentiated from the others, except that it is longer, and the whole antennæ being practically cylindrical throughout instead of gradually narrowing to tip; (2) the abdomen being much narrower and longer relatively to the thorax; (3) the 4th posterior cell being distinctly closed before the border; and (4) the hind femora being distinctly incrassated and bearing a row of small blunt spines on the underside.

Williston, in his table of genera of North-American LEPTIDÆ, emphasizes the absence of contact of the 5th posterior cell with the discal cell, but in Loew's figure of the genotype such contact is only punctiform. These cells may be more separated in the other two North-American species; they are distinctly apart in *Pararthropeas.*

72. **Pararthropeas thereviformis**, sp. nov. (Pl. II, figs. 5, 6.)

♀ *Head* as broad as thorax; eyes bare, black, facets small, of uniform size; frons about one-seventh of the head, almost flush with eyes, blackish, with short pale pubescence, which is a little thicker just above antennæ; face not projecting beyond eyes, flattened, with nearly parallel sides, dark grey, practically bare; occiput blackish, bare, except for some short whitish pubescence behind lower margin of eyes. Proboscis short, thick, not projecting beyond base of antennæ, brown, bearing a few hairs; palpi as long as proboscis, bare, brownish yellow. Antennæ longer than breadth of head, cylindrical; 1st and 2nd joints black, bristly, 2nd shorter than 1st, as broad as long; 3rd bare, divided by seven impressed lines into eight annulations, of which the 1st is the longest, tip bluntly pointed; 3rd joint black, except the brownish-yellow 1st annulation and base of 2nd. *Thorax* oblong; dorsum black, rather flattened, with microscopic, depressed, greyish pubescence, which is a little more obvious in front of the scutellum; the latter black, with centre and hind margin yellowish, sparsely and shortly pubescent; humeri prominent, yellowish brown; pleuræ black, with very short grey pubescence. *Abdomen* subcylindrical, nearly *Phycus*-like, 7-segmented, the first six subequal, the last very short; black, with minute grey pubescence, hind margins of segments yellow; genitalia ending in two small cylindrical yellowish pieces, which are all that is externally visible. *Legs* Therevid-like, comparatively stout and strong; coxæ black, with minute grey pubescence; fore femora brownish yellow, with upper side and distal half of lower sides black; middle pair black, except narrowly at base and tips; hind pair black, with a broad yellow band just before middle; tibiæ black, except that anterior pairs are very narrowly brownish yellow at base and tips; front tarsi distinctly longer than tibiæ, posterior pairs subequal to

tibiæ; all tarsi black, with reddish-brown pubescence on underside of hind pair; all legs with minute grey pubescence; two obvious spines on middle and hind tibiæ, and it is just possible that a small one may be present on fore pair just before the slightly narrowed tips, though apparently it is absent. *Wings* pale grey, veins dark brown; halteres brownish yellow.

Length, 10 mm.

Described from a perfect unique ♀ in the Pusa collection from Khasi Hills, 1000–3000 ft., iii. 1907

Type sent to British Museum.

Subfamily CŒNOMYINÆ.

Head: antennal 3rd joint flagelliform and annulated, with styliform tip and no arista. Palpi long, thin, pointed, porrect, 2-jointed. Eyes hairy or bare, contiguous in ♂ *Thorax* and *abdomen* robust, shortly pubescent or bare; meso- and metapleuræ with tufts of pubescence; scutellum with two short blunt spines or unarmed; genitalia small. *Legs* comparatively short and strong; fore tibiæ with one spur, posterior tibiæ with two spurs. Basal wing-cells long; discal cell present; two submarginal cells, the 2nd long, with bell-mouthed tip; five posterior cells, 5th in broad contact with discal cell.

The CŒNOMYINÆ and XYLOPHAGINÆ are easily recognised by the annulated 3rd antennal joint, and the latter are distinguishable from the former by the four characters previously given in the table of genera of LEPTIDÆ.

Only a few genera and species of CŒNOMYINÆ are known throughout the world.

Life-history. That of *Cœnomyia ferruginea*, Scop., a widely distributed European and North-American species, is known. The larva is amphipneustic, cylindrical, 12-segmented; the head conical, brown, chitinized; the rest of the body with chitinized spots and bands. Pupa free. The species breeds in decaying poplars and at the roots of trees, especially beeches; the larvæ are carnivorous and voracious; their total development may last over a year.

The adult insects are rather sluggish, frequenting woods.

Genus **CŒNOMYIODES**, gen. nov.

GENOTYPE, *Cœnomyiodes edwardsi*, sp. nov.; the only species known.

Head comparatively small, narrower than thorax; placed somewhat low down; occiput flattened; epistoma separated from cheeks by an impressed line; eyes hairy, separated by moderately broad frons in ♀ (♂ unknown); antennæ 3-jointed, the 3rd flagellate, with eight annulations, ending in stylate form, arista absent; palpi long, thin, labella broad; proboscis rather short.

Thorax broad, robust; *abdomen* similar, rather longer, pointed; both shortly pubescent or nearly bare; scutellum with two blunt apical spines; genitalia small. *Legs* as noted previously. *Wings* as noted above, in rest covering abdomen, posterior cross-vein absent; alulæ well developed, alar squama small, thoracic squama very narrow.

♂ unknown.

Range. Assam.

This genus differs from *Cœnomyia*, Latr., by the broad frons in the ♀, by the anal cell being closed distinctly before the wing-margin, and by the 4th posterior cell also being closed at some distance from the margin, rounded apically, and sending no veinlet to the margin.

73. **Cœnomyiodes edwardsi**, sp. nov. (Pl. II, figs. 3, 4.)

♀ *Head* chrome-yellow, a little darker on frons, which bears a transverse streak just above antennæ, not quite reaching eye-margins; ocellar triangle black, also a stripe from it passing over vertex and part of occiput; mouth-opening pale yellowish; head bare, except for some hardly visible pale hairs on occiput, about the eye-margins. Antennæ with 1st and 2nd joints yellow, with some very short black bristles, giving the joints a partly blackish appearance; 3rd joint divided by impressed lines into eight annulations, brownish yellow, with a black streak on upper side. *Thorax* mainly chrome-yellow, although the yellow and black parts are about equal in extent; a broad black median stripe from anterior margin, where it is slightly dilated, to hind margin, narrowing shortly after passing the suture; a black stripe on each side of the median one, leaving a narrow intermediate space, extending forwards barely to the humeri, and narrowing gradually behind the suture but reaching hind margin, on which all three stripes are joined; sides of thorax yellow, underside black, with a broad black stripe running from just behind the fore coxæ, curving forwards, narrowing to a point a little below the humerus; a similar stripe joins the underside of the thorax with the wing-base, spreading out hindwards to the hind coxæ and upwards narrowly to the scutellum, which latter is yellow, the metanotum being black; dorsum covered with microscopic yellow pubescence, with a little on parts of the pleuræ. *Abdomen* with first four segments bright chrome-yellow, with a fairly wide black dorsal stripe with irregular edges, dilated on hind borders of 1st and 2nd segments, occupying two-thirds of the width of 3rd and 4th segments; rest of segments reddish brown, the black dorsal stripe carried over all but the last one, dilated on hind borders; 8th segment canary-yellow on apical half; a small curved yellow mark towards each side of 6th segment; a small indistinct yellow spot on 7th segment on each side of the middle; venter reddish brown, a small yellow mark extending over 6th and 7th segments; genitalia yellowish brown, with two rather short

projecting lamellæ. *Legs* practically bare, bright chrome-yellow, middle coxæ obscured; a short blackish-brown streak at tip of hind side of middle femora; hind legs with tip of coxæ, extreme base of femora, and a broad apical band on femora and tibiæ black. *Wings* yellow, veins brownish black; halteres bright yellow.

Length, 20 mm.

Described from a single ♀ in the British Museum from the Khasi Hills, Assam.

Subfamily LEPTINÆ.

Face with a rounded socketed epistoma; eyes bare, generally contiguous in the ♂, facets of uniform size; proboscis often swollen, conspicuous, though never very long; palpi distinct, moderately long, porrect, or pendant. Antennæ with 3rd joint simple, rounded, oval, or reniform, always with a long apical, subapical, or subdorsal arista. *Abdomen* elongate-conical; genitalia of moderate size. *Legs* slender; tibiæ with rows of minute bristles, middle pair with two spurs at tip, hind tibiæ with one or two spurs.* Alulæ well developed; alar squamæ of moderate size, thoracic pair absent.

The genera have already been tabulated on p. 103.

Genus **ATRICHOPS**, *Verr.*

Atrichops, Verrall, Brit. Flies, v, p. 291 (1909).

GENOTYPE, *Atherix crassipes*, Mg. (Europe); by original designation.

Head semicircular, a little narrower than thorax, more rounded and less tilted forwards than in *Atherix*; face with a quite bare, rounded, socketed epistoma; cheeks large, bare in both sexes; frons in ♂ nearly or quite bare, slightly narrowing from vertex to antennæ; in ♀ with a little sparse pubescence; occiput prominent, especially on lower part in ♂; eyes bare in both sexes, contiguous or practically so in ♂, facets uniform in size; the eyes in ♀ separated distinctly. Proboscis prominent, thick, with long oval labella; palpi two-jointed, prominent, slightly drooping. Antennæ rather short, the space above their base bare; 1st joint cup-shaped, 2nd more or less rounded, rather short, both bristly; 3rd kidney-shaped, with a dorsal arista.† *Thorax* slightly arched, with close short pubescence; pleuræ partly pubescent; scutellum

* The apparent disagreement here with Verrall, who states that two spurs are found on all the posterior tibiæ, is due to his ranking *Chrysopila* as a separate subfamily, in which genus the hind tibiæ possess only a single spur.

† Verrall speaks of it as "terminal, which from the shape of the 3rd joint (deepened downwards) appears to be dorsal." This author regards the tip of the 3rd joint as its furthest point in a straight line, in which case the arista is terminal, but I am regarding its tip as the extremity of its greatest length, in which case the arista is dorsal.

normally also pubescent; metanotum mainly concealed, with bare sides. *Abdomen* oblong, narrower than thorax and barely double as long; male genitalia prominent, in ♀ the tip of the abdomen pointed. *Legs* with front pair, and especially front tarsi, longer and thinner than in *Leptis*; front tibiæ shorter than, middle pair equal to, and hind tibiæ rather longer than, the corresponding tarsi; front coxæ rather long; front tibiæ unspurred; middle tibiæ with two spurs, of which the front one is considerably the longer; hind tibiæ with two nearly equal spurs; the "touch hairs" beneath the front tarsi obvious. *Wings* with the auxiliary, 1st and 2nd longitudinal veins ending at or a little beyond middle; 2nd starting well before the discal cell; 3rd beginning opposite base of discal cell, forked at a more or less acute angle rather soon after quitting anterior cross-vein, the branches gradually diverging and embracing the wing-tip; discal cell elongate; upper branch of 4th longitudinal vein forked at tip of discal cell; lower branch simple; posterior cross-vein proximad of anterior cross-vein; 5th vein forked just before posterior cross-vein, the branches separating widely, lower branch always curved downwards, meeting 6th vein at or just before wing-border, closing anal cell.

Range. Europe, India.

Life-history unknown.

The genus *Atrichops* was unfortunately wholly overlooked by me in describing the species herein referred to it, which were placed in *Atherix* at the time of description. *Atrichops* is quite well founded, the species having the cheeks distinctly bare. Set up by Verrall for *Atherix crassipes*, Mg., a European species, I know of no others belonging to it except those I have myself recorded from the East.

Table of Species.

1. Abdomen with distinct reddish or yellow markings	2.
Abdomen practically all black, at most a bluish-grey band at base or 1st segment pale yellow	5.
2. Hind femora without distinct band near tip	3.
Hind femora brownish yellow, with a broad brown band before the tip. ...	4.
3. Basal half of abdomen tawny; wings with distinct wide median band	*calopa*, Brun., p. 114.
Abdomen mainly black, but reddish tawny towards sides at base; wings pale brown, with indistinct darker band in middle...	*lanopyga*, Brun., p. 115.
4. Sides of thorax yellowish grey posteriorly, without white stripe; middle femora black only at base and tip, hind femora black at base and tip in addition to broad median band	*limbata*, O.-S., p. 115.

Sides of thorax all black, with oblique whitish stripe; middle femora with basal half black and apical half yellow, with a broad median white band. . . . [p. 116. *intermedia*, Brun.,

5. Hind metatarsus not thickened; apical half of wing infuscated . . . . . 6.

Hind metatarsus distinctly thickened; wing pale, with approximately three darker bands . . . . . [p. 117. *metatarsalis*, Brun.,

6. Apical half of wing without narrow pale band in the infuscated portion; 4th posterior cell nearly closed; length, 10 mm. . . *cincta*, Brun., p. 118.

Apical half of wing with such a pale band; 4th posterior cell widely open; length, 6 mm. . . [p. 119. *cærulescens*, Brun.,

74. **Atrichops calopa**, *Brun.* (Pl. II, fig. 7.)

Atherix calopa, Brunetti, Rec. Ind. Mus. ii, p. 420, pl. xii, fig. 2 (1909).

♂ ♀ *Head* with vertex black; frons blackish, with bluish grey shimmer; proboscis and palpi blackish, the latter hairy below; antennæ brownish yellow, with a trace of bluish grey dust on upper side of two basal joints; occiput blackish grey, with a thick fringe of long whitish-grey hair, which is absent on the upper part; lower facets of eye barely smaller than upper ones. *Thorax* dark brownish black, moderately shining; humeri shining brown; sides of thorax brown, dusted with light bluish grey; scutellum dark brown, with erect brown hairs. *Abdomen* with first four segments mainly yellow, but dark brown on the upper side of 1st at the base, and a narrow dark brown dorsal line, with a narrow line at each side of the abdomen, these three lines extending over the four segments; posterior border of 4th segment dark brown, the colour extending forward in the centre, till it joins the dorsal stripe; remainder of abdomen dark shining brown, the posterior border of each segment bearing a little bluish grey dust; venter yellowish; the whole abdomen with moderately long hairs of similar colours to that of the respective parts on which they are placed; genitalia moderately large, dark brown, shining, with black hairs. *Legs* with very short black hairs; coxæ dark brownish, with bluish grey shimmer; femora yellow, basal third in fore pair, basal half in middle pair, and basal two-thirds in hind pair black; tibiæ yellow, knees brown; basal half of tarsi yellow, apical half black. *Wings* very pale grey, apical half a little darker; discal cell three times as long as broad; no distinct stigma; a brownish irregular streak from the centre of the fore border, reaching to about halfway across the wing; halteres yellow, knobs black; tegulæ blackish with yellow edges.

Length, 8–10 mm.

Described from three ♂ ♂ in fairly good condition, in the Indian Museum collection. The type is from Sadiya, Assam, and the others from Tenasserim.

75. Atrichops lanopyga, *Brun.* (Pl. II, fig. 8.)

Atherix lanopyga, Brunetti, Rec. Ind. Mus. ii, p. 420, pl. xii, fig. 3 (1909).

♀ *Head* with rather more than the upper half of frons velvet-black, remainder of frons, the vertex, and face below antennæ blackish, with bluish grey reflections; antennæ with two basal joints brown (third missing); eye-facets of uniform size; proboscis and palpi blackish, the latter pubescent above and below; occiput blackish grey, with a continuous fringe of short grey hair. *Thorax* black, with whitish grey reflections at the sides and on the humeri; scutellum black, with black hairs, posterior border brown. *Abdomen* mainly black; 1st segment dark brown, the colour extending as a wide dorsal stripe across the 2nd; sides of first two segments occupied by a large, light yellow, translucid spot; 3rd segment velvet-black, with a bicoloured spot at the sides of the posterior border, the anterior half of this spot being orange and the posterior half grey, the orange-colour extending along the sides of the abdomen in a streak, until it reaches the large translucent side-spots in front of it; remaining segments black, whitish grey posteriorly, the sides of 6th and 7th being light orange-brown; anal process black; dorsum of abdomen with yellowish hair, which at the tip becomes brown; venter yellow, with soft yellow hair, the middle segments with some irregular black marks. *Legs*: coxæ brown, with bluish white shimmer, and silky white hair; femora yellow, base of fore pair and basal half of middle and hind pairs light brown; tibiæ brownish yellow, hind pair darker; tarsi brownish black; the femora have a little pale yellow hair, which is brown on the tibiæ, bright golden brown on hind pair, and black on the tarsi. *Wings* pale grey, with a faint brown streak from the elongated brown stigma reaching nearly to the posterior border; a small elongated clear spot in the middle of the discal and of the fifth posterior cells; discal cell $3\frac{1}{2}$ times as long as broad; halteres yellow, knobs black; tegulæ pale yellow, transparent.

Length, 10 mm.

Described from one ♂ in good condition in the Indian Museum collection from Sadiya, Assam.

76. Atrichops ? limbata, *O.-S.* (Pl. II, fig. 10.)

Atherix limbata, Osten-Sacken, Berl. ent. Zeits. xxvi, p. 100 (1882); Brunetti, Rec. Ind. Mus. ii, p. 418, pl. xii, fig. 4 (1909).

♀ *Head*: vertex cinereous grey, with a few blackish hairs, upper half of frons dull coal-black, lower part bluish grey with (seen from above) a central small black spot, lower part of face blackish grey, proboscis brown; antennæ blackish grey with a few hairs at base, 3rd joint tawny, arista long; eyes blackish; occiput bluish grey, with a fringe of light hairs, which are longest

behind the sides of the eyes; palpi black, hairy below. *Thorax* æneous black above, the colour not attaining anterior margin except as a wide stripe in the centre, but extending to both wings and to the scutellum; humeral calli tawny, with a whitish-grey tomentose spot, contiguous to each, on the anterior border; a bluish grey spot in front of each wing, placed almost on the dorsum; sides of thorax yellowish grey posteriorly; mesopleuræ bluish grey; scutellum yellow, base blackish; metanotum blackish grey. *Abdomen* brownish yellow, with a black dorsal stripe on first three segments, which spreads out over the greater part of the 4th and 5th segments; tip of abdomen yellow, sides with a blackish line and a fringe of black hairs mixed with some paler ones; venter yellowish; some short pale hairs over the dorsal surface of the abdomen. *Legs*: fore coxæ yellowish with bluish-grey reflections, posterior coxæ blackish, all of them black at the junction with the femora, which are yellow, with the tips narrowly black, the middle pair having a very small black streak on the underside near the base, and the hind pair a wide black ring in the middle; remainder of legs black, but middle tibiæ dark brownish yellow. *Wings* pale grey, rather strongly iridescent, with a rather dark brown middle stripe from the centre of the costa, narrowing posteriorly and reaching hind margin of wing at tip of anal cell; distal part of wing dark grey down to the fifth posterior cell, the centre of which is pale grey (reaching to the border), but a rather wide pale grey space remains between the dark brown stripe and the distal dark grey part, this clearer part ceasing at the fifth posterior cell; fifth longitudinal vein dark brown suffused; upper transverse vein placed just before one-third of the discal cell; halteres yellowish, knob black.

Length, 8 mm.

I describe under the above specific name a ♀ specimen (now in the Indian Museum collection) captured from the base of the Dawna Hills, Amherst District, Lower Burma, 1. iii. 1908 (*Annandale*), which I at first thought was a new species. It differs from *limbata*, O.-S., by the presence of the clearer space in the dark distal part of the wing and by the hind femoral band being in the middle, not near the tip, other minor differences hardly being specific. My augmented description may enable others to identify it definitely either as *limbata* or as new.

77. **Atrichops intermedia**, *Brun.* (Pl. II, figs. 11, 12.)

Atherix intermedia, Brunetti, Rec. Ind. Mus. iii, p. 211 (1909).

♂ This species closely resembles both *limbata*, O.-S., and *calopa*, Brun., and takes an intermediate position between the two.

From *limbata* it is distinguished by an all-black thorax, with a little whitish shimmer on the humeral parts, round the edges of the dorsum, and in front of the insertion of the wings; also by an oblique whitish stripe on the sides of the thorax, which otherwise are wholly black, as is also the scutellum. The legs are

black; the fore femora (except base and tip), the apical half of the middle femora, the middle tibiæ wholly, and the hind femora are yellow, but the latter bear a broad deep black band, occupying about the middle half of their length. The wing has a large, very distinct, blackish-brown stigma, whilst the cross-band on the wing is much darker. The abdomen is differently coloured, closely resembling that of *calopa*, except that the posterior half of the 4th and 5th segments is occupied by a whitish band, which is invisible from certain points of view; the basal half of the 5th, and the whole of the 6th, segment is black.

From *calopa* the broad band on the hind femora easily separates it, this character being consistent in the ten specimens examined. The wing-marks also distinguish it, owing to the prominent stigma and the much more distinct apical part.

Length, 8½ mm.

Described from ten ♂ ♂ in excellent condition taken by Dr. Annandale, 16. iv. 1909, on Paresnath Hill, West Bengal, 2000 ft., on rocks at the edge of a small jungle-stream, where it was present in large numbers; Bojiaghat, 12. vi. 1915.

This is evidently a good species, the ten specimens agreeing exactly in all particulars, whilst the three examples of my *calopa* are also consistent; *limbata* of Osten-Sacken, however, according to him, appears to be variable. The present species is best described as possessing the abdomen of *calopa* with the wing of *limbata*, with the addition of an all-black thorax and a large black stigma.

78. **Atrichops metatarsalis**, *Brun.* (Pl. II, fig. 14.)

Atherix metatarsalis, Brunetti, Rec. Ind. Mus. ii, p. 422, pl. xii, figs. 5, 6 (1909).

♂ *Head*: vertex small, prominent, with a few bristly hairs; eyes contiguous for a moderate distance, the facets of the lower third much smaller; antennæ pale yellow, with a few bristles and nearly straight arista; face bluish grey, palpi black; lower side of face with some long black hairs; occiput grey, encircled with a row of irregular bristly hairs of different lengths. *Thorax* rich shining brown, with a semi-livid tinge towards the sides in front; sides with bluish grey reflections; scutellum concolorous, with a row of minute black bristles on posterior border; dorsum of thorax with scattered minute black bristles. *Abdomen* with 1st segment pale yellowish, with a few black hairs and bristles; remainder shining black; dorsum of 2nd with a slight pale yellowish tinge; whole abdomen with black bristly hairs; venter black, pale yellow at base; genitalia black, hairy, apparently in three pieces, moderately prominent. *Legs* pale brownish yellow, posterior coxæ shining brown, middle femora brownish except at base and tip, hind femora with distal half dark brown, hind tibiæ dark brown; hind metatarsi much thickened; all the legs shortly pubescent, the hairs being softer and longer below the femora and shorter and more bristly on the tibiæ (especially the hind pair)

and tarsi. *Wings* clear, with three distinct broad brown bands from the costa towards the hind margin: the first beginning at the basal cross-veins, filling one-half of the basal cells and one-third of the anal cell, thence disappearing; the second is rather narrower and exactly in the middle of the wing, reaching from the costa almost to the hind border, enclosing the inner cross-vein and nearly filling the basal half of the discal cell; the third is joined on the costa to the second by the stigma, extends nearly to the tip of the wing, leaving a narrow clear margin, and reaches the posterior border, filling the whole of the second, third, and fourth posterior cells. Stigma very dark brown, filling all the cell as far inwards to just above the origin of the third longitudinal vein; halteres rather long and prominent, pale yellow; clubs black, elongated.

Length, 5 mm.

Described from a perfect unique specimen in the Indian Museum from the Dawna Hills, 2000–3000 ft., 2–3. iii. 1908 (*Annandale*).

A very distinct species, with the appearance of a *Chrysopilus*.

79. **Atrichops cincta**, *Brun.* (Pl. II, fig. 9.)

Atherix cincta, Brunetti, Rec. Ind. Mus. ii, p. 421, pl. xii, fig. 1 (1909).

♀ *Head* with frons dull black, bare, the part immediately above antennæ with ash-grey reflections and a few hairs; vertex blackish, only slightly indented; ocelli dull red-brown, eyes brown, with a bronze reflection, facets of uniform size; occiput grey, with a fringe of short black hairs on upper half, which are replaced by longer scattered white hairs on lower half; antennæ dark brown, normal, first joint hairy above only, second joint hairy above and below; face below antennæ ash-grey; palpi and proboscis cinereous grey, with scattered hairs, the former with some strong black hairs at tip. *Thorax* blackish, with traces of close cinereous grey pubescence, which in perfect examples probably covers all the dorsum and sides; with also some scattered longer hairs over the whole thorax. Scutellum blackish, with scattered yellowish grey hairs and reddish-brown posterior border carrying a fringe of black and grey hairs. *Abdomen* shining dark blackish brown, shoulders prominent, forming tawny-brown calli with grey hair; underside of 1st segment continued in front as a yellow scaly process extending downwards till it reaches the hind coxæ; 1st and 2nd segments occupied by a pale bluish-grey transverse band, narrowly interrupted in the middle, extending over the sides to a considerable extent, and clothed with pale concolorous hair which is continued along the lower sides of the whole abdomen to the tip; dorsum clothed with short black pubescence which, beginning with the 3rd segment, extends round the sides until it meets the line of grey side-hairs; a very narrow bluish-grey border to 4th and 5th segments, the extreme edge of 5th and 6th segments being orange-brown. *Legs* blackish brown,

minutely pubescent; apical half of all femora and the whole of the middle tibiæ reddish tawny: some whitish-grey hairs below femora; hind tibiæ shortly pubescent, with reddish-bronze reflections. *Wings* pale grey, apical half pale brownish; no distinct stigma, but a rather broad ill-defined brown band runs from the stigmatic portion of the costa towards the posterior border, but fades away before reaching it; discal cell three times as long as broad; anal cell closed just before the border; by a strong convergence of the veins the fourth posterior cell (*termin*, O.-S.) is almost closed, thus (if a stable specific character) separating this species from all other Oriental species in this genus; halteres yellowish, knobs black, rather large; tegulæ cinereous grey.

Length, 10 mm.

Described from one ♀ from Margherita and two ♀ ♀ from the base of the Dawna Hills, Amherst District, Lower Burma, 1. iii. 1908, all in the Indian Museum (*Annandale*); Bojiaghat, 12. vi. 1915; Kathgodam, 16. vi. 1915.

80. **Atrichops cærulescens**, *Brun.* (Pl. II, fig. 13.)

Atherix cærulescens, Brunetti, Rec. Ind. Mus. vii, p. 463, pl. xxxvii, fig. 3 (1912).

♀ *Head* blackish, mainly dusted with bluish grey; frons, from the ocelli downwards for three-fourths of the distance to the antennæ, shining black, bare, in which colour is inset a deep dull velvet-black triangle, its base on the lower margin of the shining part: antennæ black, dusted with bluish grey, 3rd joint dull reddish yellow; mouth-parts dusted with bluish grey. *Thorax* blackish, with a shining bluish-grey reflection; two not very obvious whitish dorsal stripes, and there are greyish reflections on the shoulders, posterior corners, and elsewhere, viewed in certain lights; a few soft black hairs on dorsum; sides, pleuræ, and scutellum concolorous, a little yellowish behind the thoracic stigma. *Abdomen* blackish, barely shining, with short sparse greyish pubescence; 1st segment dusted with bluish grey, 5th and 6th with light bluish-grey hind margins; venter mainly blackish. *Legs* black, minutely pubescent, coxæ dusted with bluish grey. *Wings* very pale grey; across the centre a reversed triangular brown spot reaching from the costa to the hind margin, where its apex meets the tip of the closed anal cell, the colour filling most of the discal cell and crossing the tip of the upper basal cell; following the discal margin of this brown triangle (at a distance leaving a moderately wide intermediate clear band) is the proximal margin of a second large brown band, which fills thence the whole of the discal part of the wing; a brown streak in the middle of each basal cell; stigma dark brown, filling distal half of cell; halteres yellow, clubs black.

Length, 6 mm.

Described from a perfect ♀ in the Indian Museum from Kurseong, 5000 ft., 6. ix. 1909 (*Annandale*).

Genus **ATHERIX**, *Mg.*

Atherix, Meigen, Illig. Mag. ii, p. 271 (1803).
Ibisia, Rondani, Dipt. Ital. Prod. i, p. 154 (1856).
Pelechoidocera, Bigot (p.p.), Ann. Soc. Ent. France, (2) ii, p. 91 (1856).

GENOTYPE, *Atherix ibis*, F.; by general acceptance.*

This genus differs from *Atrichops*, Verr., chiefly in the pubescent frons and face. In *A. ibis*, a well-known European species, both these parts bear dense long pubescence, whereas in *Atrichops* they are bare.

Verrall, in describing *Atrichops*, adds a number of minor characters which, though illustrative of the type-species (*crassipes*, Mg.), may possibly not occur in all the species that it may be advisable to refer to the genus.

The characters therefore allotted in this work to *Atrichops* may be considered to apply to *Atherix* also.

Only one species is Indian, *labiata*, Big.†

Range. World-wide.

Life-history. It has been said that the larva has tracheal gills, whilst Brauer states that it possesses true pseudopods instead of the roughened intercalated areas generally present in this family. The ♀ ♀ of *A. ibis*, a European species, cluster on a bough and lay their eggs all together in a mass, dying on the cluster, the larvæ when hatched falling into the water.

81. **Atherix labiata**, *Big.*

Atherix labiata, Bigot, Bull. Soc. Zool. France, xii, p. 117 (1887); Brunetti, Rec. Ind. Mus. iii, p. 212 (1909).

♀ "Proboscis at least as long as height of head; labella distinctly enlarged; palpi bare, a little dilated, dark brown; frons black, with a few black hairs, face whitish-tomentose. *Thorax* and scutellum moderately shining black, the former with grey reflections, tomentose on anterior part, sides grey-tomentose. Coxæ black; halteres chestnut, with tips blackish. *Abdomen* shortly pubescent, grey at the sides; 1st segment black at base and middle, with a half band of grey dust on each side; 2nd segment dull tawny, with a triangular basal black spot, and at the middle of each side a brownish transverse half-band; 3rd segment with a transverse reddish line in middle. *Legs* all black, except base of hind femora which is tinged with pale yellow. *Wings* nearly clear at base, posterior half brownish grey, with three

* Coquillett adopts *Rhagio diadema*, F., as genotype, but Verrall successfully establishes *ibis* as such (British Flies, v, p. 285).

† My thanks are due to Mr. Collin for the information that *labiata*, Big., is truly an *Atherix* after an examination of the type, otherwise, as all the species that have come before me belong to *Atrichops*, I should have been tempted to include *labiata* also in that genus.

broad contiguous hyaline spots; stigma oblong, brown; veins with brownish infuscation; anal cell closed before the border." (*Bigot.*).

Ceylon.

Type in Bigot's collection.*

Genus **SURAGINA**, *Walk.*

Suragina, Walker, Proc. Linn. Soc. Lond. iv, p. 110 (1860).

GENOTYPE, *Suragina illucens*, Walk.; the original species.

♀ "Body linear, moderately broad. *Head* almost as broad as the thorax; vertex and front of equal breadth. Proboscis porrect, compressed, a little shorter than the breadth of the head. Palpi lanceolate, contiguous to the proboscis. Antennæ very short; 3rd joint round; arista slender, bare, longer than the antennæ. *Thorax* a little narrower in front. *Abdomen* somewhat flat, less than twice the length of the thorax, obtuse at the tip. *Legs* bare, unarmed, rather long and slender. *Wings* moderately long and broad; radial vein slightly curved; forks of the cubital vein a little longer than the preceding part; 3rd externo-medial vein inclined beyond the discal areolet towards the 4th, which is straight; subanal and anal veins united close to the border; discal areolet nearly six times longer than broad, its fore side hardly angular." (*Walker.*)

Range. Ceylon, Celebes, Gilolo.

It is necessary to reproduce Walker's own description of this genus unaltered, since no example has been available for re-description.

Osten-Sacken drew attention † to the fact that, in setting up *Suragina*, Walker omitted to note its close affinity to *Atherix*, and observes that that author had labelled as a *Suragina* a species which Osten-Sacken himself subsequently described as *Atherix limbata* (loc. cit.). Yet Walker certainly knew of *Atherix*, a not uncommon European, even British, genus.

Karsch admits the great affinity between the two genera, but seems to have successfully differentiated them.‡

Only three species are known.

82. **Suragina elegans**, *Karsch.*

Suragina elegans, Karsch, Berl. ent. Zeits. xxviii, p. 174 (1884).

♂ ♀ Blackish blue, black-haired. *Thorax* with two short white longitudinal stripes, and with white tomentum at the sides. *Abdomen* in ♂ broadly red towards the sides on the 2nd to the

* A specimen in my own collection from Maskeliya, Ceylon, taken in March is probably this species, but unfortunately the type is not available for comparison in India.

† Berl. ent. Zeits. xxvi, p. 101 (1882).

‡ See table of genera, p. 104. It must be remembered that *Atherix* and *Atrichops* differ only in the hairy and bare cheeks respectively.

5th segments, in ♀ only on the 2nd and 3rd; 4th and 5th segments with broad white posterior border in both sexes; venter yellowish red. *Legs* very long; in ♂ wholly brownish black, in ♀ with base of hind femora yellowish. *Wings* in ♂ pale grey, in middle clear, with a broad irregular dark brown longitudinal stripe; wings in ♀ clear, only the tip greyish, and the brown stripe darker. Frons in ♀ velvet-brown, with white pubescence above antennæ; occiput white-haired; tip of abdomen in ♂ pointed and forked, in ♀ flat, obtuse.

Length, 8–8·8 mm.

Ceylon (*Nietner*).

The foregoing is a translation of Karsch's description.

Genus **MACELLOPALPUS**, *Big.*

Macellopalpus, Bigot, Bull. Soc. Ent. France, (6) vi, p. xlviii (1886).

GENOTYPE, *Macellopalpus flaveolus*, Big.; by original designation.

This genus differs from *Atrichops* in having a smaller 1st antennal joint, the 3rd (damaged) "apparently hardly dilated on underside." Palpi quite bare, large, and conspicuously oval on upper side, nearly straight below. Eyes bare. Pulvilli very small. Anal cell closed before the border.

Range. India, New Guinea.

M. fascipennis is distinguished from *M. fulvidus* by the brown streak across the wings.

83. **Macellopalpus fulvidus**, *Brun.* (Pl. II, fig. 15.)

Macellopalpus fulvidus, Brunetti, Rec. Ind. Mus. ii, p. 424, pl. xii, fig. 8 (1909).

♀ *Head* with frons parallel-sided, slightly less than one-fifth of the head in width, with a deep vertical central groove, terminating before reaching the vertex, on which the three brownish-yellow ocelli are very prominent; frons just above antennæ grey-dusted, the remainder of it shining black, quite smooth; face below antennæ, and cheeks, grey-dusted; antennæ brownish yellow, 3rd joint darker, with long arista; proboscis light brown (tip broken off); palpi blackish brown, lighter at base; eyes black, facets of uniform size; occiput bluish grey, with fringe of yellow hair, which behind the vertex is replaced by two or three irregular rows of stout black bristles. *Thorax* light brown, with sparse short hair; sides with a slight yellowish tinge; metanotum lighter; scutellum light brown. (Though in the unique type the scutellum is bare, there are traces of it having borne bristles along the posterior border, and others, to a less extent, on the dorsum.) *Abdomen* light brown, nearly bare; posterior borders of segments narrowly blackish; venter light brown, with a central blackish

stripe. *Legs* missing, except the coxæ, and the femur and tibia of one hind leg; all these are uniformly light brown, the femur having a very narrow black ring at the base. *Wings* pale yellow, costal border darker yellowish brown; stigma brown, distinct; halteres light brown, with a black spot on upper side of knob.

Length, 10 mm.

Described from one specimen in the Indian Museum from Sibsagar.

Bigot's description of his *flaveolus* is very short, and would apply to the present species, but as he marked *fulvidus* himself as a new species I presume it to be distinct.

Some considerations on the possible synonymy of this genus with *Leptipalpus*, Rond., and *Heliomyia*, Dol., have been set forth by me.* Of the three genera, *Leptipalpus* (1850) would take precedence. Apart from the two species described by me, only one other is known, *flaveolus*, Big., from New Guinea.

84. **Macellopalpus fascipennis**, sp. nov.

♀ *Head* with frons and face between one-third and one-fourth the width of the head, of nearly uniform width, dusted with greyish brown; ocellar triangle slightly raised, concolorous, with a few bristles, ocelli very distinct, whitish, with black nuclei; occiput greyish brown, with short bristles on at least upper half; antennæ brownish yellow, 3rd joint black, grey-dusted, rounded, with blunt tip and a dark brown, very long arista. The bulbous epistome, rather short proboscis with large hairy labella, and large spatulate palpi all brownish yellow, latter black at tips. *Thorax* and scutellum wholly brownish yellow (bristles broken off). *Abdomen* with 1st segment brownish yellow; 2nd moderately dark brown, graduating into yellowish on posterior half; 3rd and 4th dark brown, with distinct yellowish hind margins; 5th much narrower, short; following segments still narrower, all dark brown with indistinct yellowish hind margins. Dorsum with uniform, but neither conspicuous nor dense, short black pubescence, which becomes bristly towards sides at base of abdomen. Venter yellowish on basal half, blackish on posterior half, hind margins of segments pale. *Legs* brownish yellow, tibiæ very slightly darker, tips of tarsi blackish. *Wings* yellowish grey, stigma dark brown, large, clear-cut; a narrow brownish streak from it nearly to hind margin, embracing fork of 3rd vein and outer side of discal cell; extreme wing-tip just perceptibly clouded; an indistinct suffusion over lower branch of 5th vein; halteres large, stem thick, brownish yellow, knobs brown.

Length, 5 mm. (excl. ovipositor).

Described from a unique female in the British Museum from the Khasi Hills, Assam.

* Rec. Ind. Mus. ii, p. 425 (1909).

Genus **LEPTIS**, *F.**

Leptis, Fabricius, Syst. Antl. p. 69 (1805).
Rhagio, Fabricius, Syst. Entom. p. 761 (1775).
Sylvicola (*Sylvicolæ*), Harris, Expos. Engl. Ins. p. 100 (1782).

GENOTYPE, *L. scolopacea*, F. (as *Rhagio scolopaceus*); by definite selection by Fabricius at the erection of *Leptis*.

Head transverse, about as broad as thorax; face very short, quadrangular, bare, socketed between the large eye-margins (or side-cheeks), the latter separated from the face itself by a deep channel, and bearing long, rather conspicuous pubescence. Proboscis prominent, thick, cylindrical, short, with distinct ribbed labella; palpi 2-jointed, distinct, with bristly pubescence, rather drooping. Eyes bare, contiguous or subcontiguous in ♂, facets of uniform size, or nearly so; in ♀ well separated, the frons with a shallow transverse suture a little above the antennæ. Antennæ short, porrect; 3rd joint short, conical or almost reniform; arista apical, rather long, fine, and upturned. *Thorax* practically quadrangular, with rounded corners, slightly arched; pubescence on the disc short, well distributed, rather bristly, with depressed pile intermixed; pleuræ mainly bare; prothorax and metapleuræ with rather long distinct pubescence. *Abdomen* nearly twice as long as thorax, elongate-conical, with at least seven obvious segments; pubescence fairly abundant, often rather bristly, but never like adpressed pile, short except at the basal corners. Genitalia in ♂ rather prominent, knobbed, and blunt; ovipositor of ♀ jointed, appearing like an 8th segment, with two pairs of ovate lamellæ. *Legs* rather long, especially the hind pair; hind femora slightly thickened; coxæ rather long; front tibiæ without spurs; front tarsi with "touch hairs" below.† *Wings* as in *Atrichops*, but the

* The name *Leptis* is of too old standing to be changed, and Verrall thoroughly explains all questions of synonymy concerning it (Brit. Flies, v, p. 262).

† In a paper by Mik (Wien. ent. Zeit. xviii, p. 230, 1899) it has been suggested that there exists an organ of touch below the front tarsi in some genera of LEPTIDÆ, TABANIDÆ, DOLICHOPODIDÆ, EMPIDÆ, and some groups of ACALYPTRATA and NEMATOCERA, in the shape of several long fine hairs, curved towards the tips, which project beyond the normal short stiff pubescence and the rather longer, regularly arranged, stiff bristles. He has noticed that some species of *Leptis*, when resting on leaves, sometimes support the body on the four posterior legs and make a sweeping curved movement with the front tarsi, as though brushing up minute particles from the surface, after which they appear to hold the collected matter between the tarsi, and bending down the head seem to imbibe it through the proboscis. These "touch hairs" occur mainly below the front tarsi, though existing to a less extent on the middle pair also, where they are not longer than the ordinary pubescence and bristles, whilst they are absent on the hind tarsi. In *Atherix marginata*, F., a not uncommon European species, these hairs are abundant, though almost absent in *A. ibis*, F., whilst in other Leptid genera, including *Chrysopilus*, closely allied to *Leptis*, they are not present. They exist, however, in *Tabanus*, and in this character Mik sees an additional kinship between LEPTIDÆ and TABANIDÆ. Verrall gives a translation of this interesting paper (Brit. Flies, v, p. 236).

basal cells shorter, the anterior cross-vein nearer base of discal cell and anal cell open.*

Range. Apparently almost world-wide, except Africa and Australia, but one species comes from Algeria.

Life-history. The larva of *Leptis* has the mouth-parts well developed, and possesses two-jointed antennæ. It is "very active, and is distinguished by having the stigmatic orifice surrounded by four quite equal, quadrangularly placed prominences, and at the other extremity of the body a blackish naked triangular plate; on the inner side of each of seven of the abdominal segments there is a band of spines" (Cambridge Nat. Hist.). The larvæ live in the earth, feeding on cockchafers and other beetles, some, the common European *L. tringaria* for instance, living on earthworms. Bouché has described the metamorphoses of some European species. The pupa is mummy-like; the perfect insects occur on trees and shrubs in more or less shady spots, and are generally distributed.

Table of Species.

Wings with obvious suffusions; species not nearly unicolorous.	
Length 6 mm.; wings pale grey, broadly darkened	*apicipennis*, Brun., p. 125.
Length 3 mm.; wings pale brown, with clearer parts.	*discoidalis*, Brun., p. 126.
Wings clear.	
Nearly wholly unicolorous species; length 5 mm.	*unicolor*, Brun., p. 126.
Abdomen with distinct triangular spots on 3rd, 4th, and 5th segments; length 7–8 mm.	*triangulata*, sp. n., p. 127.

85. **Leptis apicipennis**, *Brun.* (Pl. II, fig. 16.)

Leptis apicipennis, Brunetti, Rec. Ind. Mus. ii, p. 423, pl. xii, fig. 7 (1909).

♀ *Head*: frons and face grey-dusted, with a large, shining black, inverted heart-shaped tubercle in the middle, and extending on each side to the eyes; ocelli reddish tawny, semi-transparent, situated on the extreme vertex; first antennal joint bright tawny (rest absent); proboscis shining chestnut-brown, bare, grey-dusted at sides; palpi large, tawny brown, hairy; occiput semicircular, with a weak irregular fringe of short grey hairs. *Thorax* brown above, moderately shining, sides dark greyish; scutellum yellowish tawny, with a very few short irregular black hairs. *Abdomen* tawny, with scattered pale hairs; with a wide, irregular, blackish-brown dorsal band, which occupies the whole of the last two or three segments; and with a blackish irregular line on the sides

* Rare exceptions are known (as *L. funebris*, Mg., of Europe), but not amongst Oriental species.

of the abdomen. *Legs* tawny yellow, fore tibiæ yellowish white; hind tibiæ rather brownish, paler towards tip; tarsi tawny brown (middle pair wanting). *Wings* pale grey; a moderately dark brown apical spot begins on the costa in a straight line with the fork of the third longitudinal vein, extends thence to the tip of the wing, and posteriorly until it fills half the first posterior cell, also the whole of the second posterior cell, and then, by bending slightly outwards, the greater part of the third posterior cell; a brown streak also begins at the inner cross-vein, passes over the basal part of the discal cell, passes longitudinally through the fourth posterior cell, nearly filling it, and spreading over part of the fifth posterior cell also, and on attaining the border extends each way, meeting on one side the hind part of the apical spot, and extending on the inner side towards the anal lobe of the wing; no distinct stigma; halteres tawny yellow.

Length, 6 mm.

Described from one ♀ in the Indian Museum from Margherita, Assam.

86. **Leptis discoidalis,** *Brun.*

Leptis discoidalis, Brunetti, Rec. Ind. Mus. vii, p. 463 (1912).

♀. *Head* blackish, vertex black, frons dusted with blue-grey; antennæ and proboscis moderately dark brown, palpi black; occiput bluish grey. *Thorax* and scutellum clear shining brown; humeri, sides, and metanotum a little lighter. *Abdomen* darker brown, with short pale pubescence; posterior margin of segments with a not very distinct blackish band; genitalia small short-cylindrical, with two small terminal lamellæ. *Legs* pale brownish yellow, microscopically pubescent. *Wings* pale brown; discal cell, 2nd basal cell, 5th posterior cell, and all the wing posterior to these cells nearly clear; no distinct stigma, but the region along both sides of the 1st longitudinal veins blackish; halteres dark brown.

Length, 3 mm.

Described from two ♀ ♀ in the Indian Museum, Kurseong, 5000 ft., 7. vii. 1908 (*type*), and Darjiling, 7000 ft., 7. viii. 1909 (*C. Paiva*).

87. **Leptis unicolor,** *Brun.*

Leptis unicolor, Brunetti, Rec. Ind. Mus. vii, p. 464 (1912).

♂ *Head* with eyes contiguous for half the distance from vertex to antennæ; frons dark blackish grey, ocellar triangle small, ocelli distinct, the vertex grooved on each side of the middle, near the eye; occiput grey, posterior ocular orbit with a fringe of delicate pale yellow hairs. Antennæ yellow, tip of 3rd joint, with its arista, black; 1st and 2nd joints short, 3rd subconical. Proboscis relatively small, and much more slender than in most species,

yellow, as are the rather distinct elongate palpi, bearing black bristly hair. *Thorax* uniformly light brownish yellow; in certain lights small quadrate grey reflections on the shoulders, and a distinct broad whitish-grey horizontal stripe across the pleuræ. *Abdomen* concolorous; both thorax and abdomen with very sparse short pale hairs; venter similar. *Legs* with coxæ and femora concolorous; knees narrowly brown; tibiæ a little darker brownish yellow, becoming nearly or quite brown at the tips; tarsi dark brown; legs minutely pubescent. *Wings* uniformly pale yellowish grey. The 2nd posterior cell narrow, the sides almost parallel; anterior cross-vein before one-fourth of the discal cell; branches of 4th longitudinal vein issuing from discal cell well separated, and cell widely open; halteres light brownish yellow.

Length, 5 mm.

Described from a single perfect ♂ in the Indian Museum from Darjiling.

88. **Leptis triangulata**, sp. nov.

♂ *Head* with vertical triangle small, black, shining, bare, extreme vertex with a few short, black, bristly hairs; ocelli dull reddish brown; eyes black; frons, epistoma, and cheeks whitish grey, slightly shimmering, the last with pale yellow hairs; antennæ orange, 1st and 2nd joints slightly bristly, 3rd approximately conical, with long black arista; proboscis brownish yellow; palpi blackish with numerous bristles; back of head greyish, with short pubescence above and longer yellow hairs below. *Thorax* brownish yellow; dorsum with three shining black stripes, the median one broad, beginning on anterior margin, the outer ones narrower, beginning later, their posterior ends gradually diminishing, all three stripes dying away before reaching the scutellum; sternopleura and pteropleura with a slight silvery-white shimmer in certain lights; whole thorax bare, except for a few black bristly hairs on shoulders, along the margins, and on the wholly brownish-yellow scutellum. *Abdomen* brownish yellow; a small rounded or pear-shaped black spot in middle of 2nd segment; 3rd, 4th, and 5th segments with a large triangular black spot at base, the angles not quite attaining side and hind margins; hind margin of 5th and all the 6th and 7th segments black or blackish, more or less shining; venter brownish yellow, hind margins of segments narrowly blackish brown; upper and lower surfaces of abdomen with short black pubescence, which is longer towards the sides; genitalia small, yellowish, mainly concealed. *Legs* brownish yellow; tips of coxæ, femora, and tibiæ more or less towards tips, and all tarsi, brownish or dark brown; legs minutely black pubescent, coxæ with mainly yellow hairs on basal half and longer black bristly hairs towards tip. *Wings* yellowish, slightly darker anteriorly; stigma indistinctly a little deeper yellow; halteres brownish yellow.

Length, 7–8 mm.

Described from a small series of males in perfect condition collected by me in undergrowth on hillside at Darjiling, 13–18. ix. 1913.

Type in my collection, co-types in the British and Indian Museums.

Genus **CHRYSOPILUS**, *Macq.*

Chrysopilus, Macquart, Recueil Soc. Sci. Agric. Lille, p. 403 (1826).
Chrysopila, Macquart, Suites à Buff. i. p. 429 (1834).
? *Styrex*, Scopoli, Ent. Carn. p. 367 (1763).
? *Heliomyia*, Doleschall, Nat. Tijd. Neder. Ind. xiv, p. 402 (1857).*
Leptis (pt.), auctores.

GENOTYPE, *Musca diadema*, L.; by designation of Westwood (1840).

Head with face socketed like a dimple. Palpi porrect or slightly upturned, not drooping. Eyes with upper facets much larger than lower ones,† generally sharply demarcated, and of a different colour; in life eyes often brilliant golden green. Antennæ much as in *Leptis*, but 3rd joint onion-shaped, rarely longer than 2nd; arista apical, long and thin. *Thorax* "with coarse golden or pale yellow depressed pile or scales, amongst which there may be some longer, thinner, erect hairs"; mesopleuræ, metapleuræ and sides of metanotum with pubescence. *Abdomen* shorter than in *Leptis*; dorsum with a considerable amount of golden pubescence as on the thorax. *Legs* long and thin; coxæ moderately large; femora with closely applied small golden or pale yellow scales, most conspicuous behind the anterior pairs, except at the tip, and in front of the hind pair; fore tibiæ unspurred, middle tibiæ with two apical equal-sized spurs, hind tibiæ with a single spur; front tarsi without "touch hairs." *Wings* rather broader than in *Leptis*; venation as in that genus, except that the anal cell is always closed at or a little before the border; subcostal vein with very small bristles; alar squamæ moderate, a single row of hairs on posterior margin.

Range. World-wide.

Life-history. The larvæ live in rotten wood or vegetable mould. Beling has described the metamorphoses of several European species, which are similar to those of *Leptis*. The perfect insects occur in woods, meadows, and shady places. The colours fade somewhat after death and the golden pubescence is especially easily rubbed off.

* *C. ferruginosus*, Wd., a rather widely distributed Oriental species and the only one referred to *Heliomyia*, is somewhat aberrant in the palpi, and may require removal to a new genus or possibly to *Macellopalpus*. See my notes under this genus and the further notes herein referred to.

† In *ferruginosus* the lower facets are barely perceptibly smaller than the upper ones, and by no means clearly demarcated. There is, however, some probability of this species having to be removed to a different genus.

Table of Species.

1.	Wings distinctly or darkly mottled (somewhat *Trypeta*-like), or uniformly dark brown	2.
	Wings never mottled or uniformly dark brown; somewhat yellowish or (*humeralis* only) pale brown ...	6.
2.	Wings more or less mottled.	3.
	Wings uniformly dark brown . ..	5.
3.	The pale spot beyond but contiguous to the stigma quite clear and sharply defined; 1st and 2nd submarginal cells and all posterior cells with a well-defined clearer spot at tip of each, but the outlines not sharply demarcated	[p. 131. *marmoratus*, Brun.,
	The pale spot adjacent to the stigma very indefinite, *not* sharply defined; *no* wing-border spots distinguishable from the rather clearer middle parts of most of the cells .	4.
4.	Prongs of upper branch of 4th longitudinal vein issuing from discal cell well separated; ground-colour of hind border of wing of same shade as remainder of wing; stigma brown, rather ill-defined; length, 3 mm.	[p. 131. *albopictus*, Brun.,
	Prongs of upper branch of 4th longitudinal vein issuing from discal cell united or nearly so; hind part of wing nearly clear, except for the infuscations along the veins; stigma nearly black, more sharply defined; length, 4 mm.	[p. 132. *ornatipennis*, Brun.,
5.	The long dark brown stigma uninterrupted	[p. 133. *luctuosus*, Brun.,
	Stigma interrupted by an elongate yellow spot	[p. 133. *flavopunctatus*, Brun.,
6.	Wing with six bluish opalescent spots; 2nd posterior cell much longer than 3rd.	*opalescens*, sp. n., p. 134.
	Wing without traces of opalescent spots; 2nd posterior cell subequal to 3rd, at least in all my species	7.
7.	Mainly black species, at least the thorax .	8.
	Mainly yellowish or brownish species, at least the thorax almost always so	18.
8.	Wings with a distinct suffusion in addition to stigma; (wings pale brown in *humeralis* only)	9.
	Wings unmarked except for the stigma	13.
9.	Wings uniformly pale brown .	[p. 135. *humeralis*, Brun.,
	Wings never uniformly pale brown; practically clear, with more or less distinct suffusions	10.
10.	Wing-tip clear, a distinct brownish suffusion from stigma to beyond middle of wing	[p. 135. *segmentatus*, Brun.,
	Wing-tip always distinctly infuscated	11.

11.	Wing-tip blackish from near stigma up to and including 3rd posterior cell. . ..	12.
	Wing-tip suffusion consisting of infuscation of both branches of 3rd vein.	*cochinensis*, sp. n., [p. 136.
12.	Second and third antennal joints and palpi black; abdomen all black; wing-tip suffusion stronger.	*gravelyi*, sp. n., p. 137.
	Second and third antennal joints and palpi yellow; abdomen yellowish at base; wing-tip suffusion less distinct	*similis*, sp. n., p. 138.
13.	Antennæ black	14.
	Antennæ yellow....	16.
14.	Stigma large, dark brown, well-defined....	*magnipennis*, Brun., [p. 138.
	Stigma brownish yellow, diffused or ill-defined	15.
15.	Femora all yellow, except the narrowly black base; stigma pale brownish yellow, ill-defined.	*flavopilosus*, sp. n., [p. 138.
	Femora all yellow, except the black basal half of anterior pairs; stigma yellowish brown, suffused	*birmanensis*, sp. n., [p. 137.
16.	Legs yellow	*yerburyi*, sp. n., p. 139.
	At least basal half of anterior femora black	*albobasalis*, Brun., [p. 140.
17.	Stigma pale yellow; two shining white spots above antennæ	*insularis*, Sch., p. 140.
	Stigma conspicuous, dark, but not always with well-defined limits	19.
18.	Wings distinctly yellow	20.
	Wings grey.	21.
19.	Lower eye-facets barely smaller than upper ones; tibiæ more or less darkened soon after the base; length, 8–11 mm... ..	*ferruginosus*, Wied., [p. 141.
	Lower eye-facets very much smaller than upper ones; tibiæ practically all yellowish; length, $5\frac{1}{2}$ mm...	*unicolor*, Brun., p. 141.
20.	Third antennal joint black ..	22.
	Third antennal joint yellow	23.
21.	Basal half of abdomen yellowish, except for a dorsal dark stripe and dark hind margins; rest of abdomen black; wings practically clear, except for a small dark brown stigma and faint transverse suffusion towards tip; narrow, graceful, nearly linear species; anal cell closed at some distance before border	*stigma*, Brun., p. 142.
	Abdomen dark shining brown, hind margins of 2nd, 3rd, and 4th segments broadly yellow; wing distinctly grey, almost yellow-tinged; large brown stigma; broader, comparatively shorter species; abdominal segments after 4th suddenly contracted; anal cell closed just before border...	*latus*, sp. n., p. 143.
22.	First antennal joint black; legs darker brown.	*sordidus*, sp. n., p. 143.
	Antennæ wholly yellow; legs yellow, tibiæ and tarsi a little darker	*alternatus*, sp. n., p. 144.

89. Chrysopilus marmoratus, *Brun.* (Pl. II, fig. 17.)

Chrysopilus marmoratus, Brunetti, Rec. Ind. Mus. ii, p. 429, pl. xii, fig. 10 (1909).

♂ *Head* with vertex much elevated, light brown, the ocelli well separated and very distinct, semi-transparent, with black centres; eyes light chestnut-brown, upper facets rather large, lower ones very small and much darker brown; eyes contiguous almost down to the antennæ, the frons receding so much as to be invisible; the inner sides of the eyes (seen from in front), also the face below the antennæ, blackish grey; antennæ, proboscis, and palpi brownish yellow. *Thorax* moderately dark brown, with sparse golden-yellow hairs on dorsum; slightly paler at sides, and with concolorous scutellum and metanotum, the former bearing some moderately long brownish hairs. *Abdomen* dark brown; 2nd segment and posterior border of 1st segment lighter; venter brown; whole abdomen lightly covered with brownish hairs. *Legs* with coxæ light brown; the single leg of the (unique) type (fore leg) is concolorous. *Wings* rather dark brown, with pale grey spots, of which the clearest is an oval one just beyond the stigma, reaching from the costa to the fork of the 3rd longitudinal vein; below this follows a spot in each of the 1st, 2nd, and 3rd posterior cells; there is a small one in the centre of the discal cell, which, with a small one in the 4th posterior cell and a large one in the 5th posterior cell, form a row; a small spot is at the tip of the marginal cell, and a larger one at the tip of the submarginal; whilst the whole posterior border of the wing is pale grey, spreading out somewhat in the cells and in the axillary cell. The veinlets forming the upper fork of the 4th longitudinal vein emerge practically together from the upper corner of the discal cell, the outer side of which is practically quite straight. Halteres light brown, with large blackish-brown knobs.

Length, 4 mm.

Described from one specimen from Sadiya, Assam, in the Indian Museum.

90. Chrysopilus albopictus, *Brun.* (Pl. II, fig. 18.)

Chrysopilus albopictus, Brunetti, Rec. Ind. Mus. ii, p. 428, pl. xii, fig. 9 (1909).

♀ *Head* wholly black, frons about one-fourth width of head; a vertical indentation just above antennæ, with slight greyish tomentum; antennæ, proboscis, and palpi tawny yellow. *Thorax* (denuded) light tawny brown, sides sublivid; scutellum concolorous, with some longish hairs on posterior part. *Abdomen* dark brown, conical, posterior borders of segments lighter; venter dark brown. *Legs* tawny yellow, femora and coxæ brighter, tarsi darker. *Wings* moderately dark brown, with pale grey patches that take the form of three irregular light bands, commencing at, or just below, the costa, of which the first begins just beyond the

stigma and terminates posteriorly on reaching the fork of the 3rd longitudinal vein; the second crosses the middle of the discal cell and attains the hind border; the third crosses the second basal and the anal cell, and is merged in the light colour of the base of the wing; the centres and hind borders of the posterior cells are also pale grey. The upper fork of the 4th longitudinal vein emerges from the upper corner of the discal cell as two separate veins, the outer side of that cell forming a distinct angle. Stigma dark brown, proportionately large, and there are traces of yellow just before it and also in the basal cells; halteres brownish yellow.

Length, 3 mm.

Described from a specimen in the Indian Museum from Margherita, Assam.

Walker's *guttipennis* must be near this species, but appears distinct, and is larger.

91. **Chrysopilus ornatipennis**, *Brun.* (Pl. II, fig. 19.)

Chrysopilus ornatipennis, Brunetti, Rec. Ind. Mus. iii, p. 212 (1909).

♀ *Head* with frons blackish grey, grooved down the centre, one-fourth of width of head, only slightly wider towards vertex; ocelli on a concolorous, slightly elevated triangle, black, with a narrow pale border and a few microscopic bristles; antennæ with 1st and 2nd joints livid brown, 3rd with greyish pubescence, bristle very long; proboscis shining, livid brown at base, bright yellow on narrow part, with two very minute, dark brown, hairy lamellæ; occiput yellowish grey above, bluish grey below, with numerous minute black bristles, especially towards the vertex. *Thorax* yellowish brown, the dorsum covered with microscopic scales, which, seen from behind, are brilliantly emerald-green on the centre and bright blue towards the sides, the posterior part, and over the whole of the scutellum; in addition to the scales the entire surface of the thorax and the scutellum is covered with long curved bristly hairs; sides of thorax uniformly shining tawny yellow. *Abdomen* brownish, becoming yellow on posterior border, covered on entire upper surface rather closely with soft black hairs, which extend round the sides and are very short on the yellow venter; they are rather thicker and longer on the fore corners of the abdomen. The 5th segment is much reduced in size, blackish grey; 6th and 7th stylate, blackish grey, with a broad distinct pale yellow posterior border, supplemented by a long thick cylindrical blackish-grey ovipositor. *Legs* with coxæ and femora bright tawny yellow, tibiæ pale brown, tarsi black; coxæ with some bristly hairs on and around them, hind pair with a black streak on apical border; middle and hind tibiæ with two short yellow spines at extreme tip. *Wings* pale blackish grey, posterior part nearly clear, and light grey or nearly clear in the following places: distal ends of basal cells; middle of anal cell; a rather narrow pale yellowish band from the middle

of the fore border (adjacent to the black stigma) to the distal end of the discal cell, thence becoming pale grey; a yellowish-grey diffused spot just beyond (and contiguous to) the stigma; all the cells below the 3rd longitudinal vein are pale grey or clear in their centres. The upper branch of the 3rd vein bears a small appendix at the bend, which is rectangular; the inner cross-vein is placed at one-third of the discal cell, and the two forks of the upper branch of the 4th vein spring almost simultaneously from the upper corner of the discal cell. Halteres yellow.

Length, 4 mm.

Described from a single perfect ♀ from Tenmalai in the Western Ghats, Travancore, South India, 22. xi. 1908 (*Annandale*), in the Indian Museum.

92. **Chrysopilus luctuosus**, *Brun.*

Chrysopilus luctuosus, Brunetti, Rec. Ind. Mus. ii, p. 430 (1909).

♂ *Head* with vertex, frons, and face blackish; antennæ dark brownish yellow; proboscis and palpi blackish; occiput blackish, with rather long greyish hair at the sides and below; eyes bright brown, lower facets much smaller than upper ones. *Thorax* mouse-colour, nearly bare; scutellum concolorous, with a row of long hairs on posterior border. *Abdomen* dark brown, with some yellowish-grey pubescence; venter dark brown. *Legs*: coxæ dark brown, with brownish-grey hair; femora and tibiæ light brownish yellow, with sparse hair on underside of femora, and a row of minute bristly hairs on outer side of hind tibiæ; tarsi brownish yellow, tips black. *Wings* with anterior half rather dark brown, the colour gradually fading away posteriorly to the pale brown hind border; mediastinal cell, nearly to its tip, darker brown, no separate stigma. Upper fork of 4th longitudinal vein issuing as two separate veins from the discal cell, the outer side of which thus contains a distinct angle. Halteres pale yellow, knobs black.

Length, 5 mm.

Described from one ♂ in the Indian Museum from Margherita, Assam.

93. **Chrysopilus flavopunctatus**, *Brun.*

Chrysopilus flavopunctatus, Brunetti, Rec. Ind. Mus. iii, p. 213 (1909).

♂ *Head* with vertex very small, elevated, the ocelli as in *ornatipennis*; facets in upper half of eyes rather larger than those in lower half; frons deep black; face dark grey; antennæ brown, 3rd joint black, bristle long, microscopically hairy; proboscis dusky yellowish brown; palpi rather robust, pale brown, hairy. *Thorax* and scutellum dark brown, with microscopic hairs, which appear bright green when seen from behind; scutellum with some rather long black hairs; sides shining dark brown, nearly bare. *Abdomen* dark brown, nearly black towards tip, with short blackish

hairs; venter concolorous. *Legs* dark brown; fore coxæ and fore femora wholly, posterior femora towards the tips, pale; knees black; all coxæ with black hairs; hind tibiæ with two pale yellow spines at tip. *Wings* blackish brown; stigma in marginal cell, elongated, deep black, extended to costa on the outer side of a short, bright yellow stripe which intersects it in the middle, this stripe also reaching to the costa; there is a pale parti-coloured irregular spot (yellowish and pale grey) at the distal end of the 1st basal cell, and extending below into the 2nd; posterior border of wing fading into light grey, the veins in this part being narrowly suffused with black; halteres pale yellow.

Length, 5 mm.

Described from a perfect ♂ in the Indian Museum from Maddathorai, Travancore State, South India, 18. xi. 1908 (*Annandale*).

94. **Chrysopilus opalescens**, sp. nov.

♀ *Head* with frons shining black (*type*) or dark brown and less shining; ocelli dirty pale yellow with a central black spot, tubercle dull blackish; a few short black bristles across vertex; face less shining than frons, dark; proboscis similar, with hoary dust; labella large, yellow; palpi black, with a few bristles; antennæ all black, with black arista, 3rd joint shortly conical, with rather longer pubescence than usual; occiput grey-dusted, with short yellow bristly hairs and some whitish pubescence behind lower eye-margin. *Thorax* and scutellum brownish yellow; pleuræ a little paler; thoracic dorsum with traces of three brown stripes (*type*) or without them. *Abdomen* brownish yellow, 1st segment all yellow, or darkened in middle; 2nd, 3rd, and 4th with a broad median dark brown band, enlarged broadly across the hind margin of each; remaining segments very narrow, more or less brownish above; venter and genitalia mainly yellow. *Legs* yellow, tibiæ dark dirty yellow, tarsi darker. *Wings* pale yellowish, with distinct bluish opalescent spots placed as follows: two transverse rows across the wings, the inner row formed by a spot in the 1st submarginal cell before forking of 3rd vein, a second in discal cell, a third in 5th posterior cell; the outer row by a spot towards end of 1st submarginal cell, one towards end of 1st posterior cell and one towards tip of 4th posterior cell; the wing-tip is occupied by another opalescent spot extending across the two submarginal cells and the 1st posterior cell; there is also a similar spot in the centre of the anal cell and another near base of costal cell, thus making nine spots in all; halteres yellowish.

Length, $4\frac{1}{2}$–5 mm.

Described from a type and two other ♀♀ in the British Museum from Pundaluoya, Ceylon (*E. E. Green*).

Taken in the same locality by Mr. Green is a ♂ in the British Museum possessing the same two transverse rows of opalescent spots, the other spots not being obvious (the wings being slightly damaged). The thorax, scutellum, and abdomen are blackish,

except for a paleness at the sides of some of the segments of the latter. The face, antennæ, and palpi are all black, and the legs are as in the female specimens. The body may possibly have been accidentally discoloured and the specimen may be the ♂ of *opalescens*, as no other species known to me possesses the peculiarity of the opalescent wing-spots.

95. Chrysopilus humeralis, *Brun.*

Chrysopilus humeralis, Brunetti, Rec. Ind. Mus. vii, p. 466 (1912).

♂. *Head* with eyes practically contiguous for the greater part of their length above the antennæ, leaving a narrowly elongate frons of the shape of an isosceles triangle, which is bluish grey; ocellar protuberance blackish, occiput dark grey; face narrowly triangular, bluish grey; antennæ brownish yellow; proboscis and palpi similar, the latter rather darker, both with yellow hairs. *Thorax* shining blackish, with pale yellow hairs; shoulders livid yellow; pleuræ dark bluish grey varying to blackish; scutellum and metanotum blackish. *Abdomen* blackish, with pale pubescence; the major part of the basal half yellowish, leaving generally a narrow anterior and posterior blackish margin of varying width to each segment; about the apical half of the abdomen all black; venter similar to upper side. *Legs* with coxæ and femora yellowish, apical half (more or less) of fore and hind femora blackish or quite black; remainder of legs dark brown. *Wings* grey, no stigma; a very slight brownish darkening about the fork of the 3rd longitudinal vein, continued in diminished intensity along a further or lesser part of the marginal cell; halteres yellowish, with blackish-brown knobs.

Length, 6 mm.

Described from three ♂♂ in the Indian Museum from Chumbi, Darjiling District, 4000 ft., vii. 1911 (*Gravely*).

96. Chrysopilus segmentatus, *Brun.*

Chrysopilus segmentatus, Brunetti, Rec. Ind. Mus. ii, p. 430, pl. xii, figs. 11, 12 (1909).

♂. *Head* with vertex jet-black, prominent; ocelli small, equidistant, whitish; eyes very large, occupying practically the whole of the head, lower facets much smaller than upper ones; whole of face grey-dusted; antennæ tawny; proboscis large, shining brown, lower part grey-dusted; palpi dark brown, with some hair; occiput grey-dusted, studded with black hairs. *Thorax* dark blackish brown, with two narrow longitudinal yellowish-grey stripes on dorsum, dividing the surface into three equal parts and a silvery-grey reflection on the sides behind the wings (seen from behind); humeral calli light yellowish brown. *Abdomen* shining black, the segments well separated, with a telescopic appearance; posterior border of first segment shining steel-blue-grey; second wholly black; rest of segments, seen in certain

lights, steely æneous, highly shining, with a dull jet-black, moderately wide posterior border; the whole abdomen moderately thickly clothed with soft black hairs. *Legs* blackish brown; base of hind femora, tips of four anterior femora, and the anterior tibiæ wholly, pale tawny brown. *Wings* pale grey; stigma brown, but ill-defined, elongated and spread over both mediastinal and subcostal cells, and from this stigmatic spot a brownish-grey band proceeds posteriorly, rapidly narrowing, and disappears on reaching the outer cross-vein, thus forming what at a short distance appears to be a brown triangular cloud, darkest in front. The lower branch of the upper fork of the 4th longitudinal vein issues from below the middle of the outer side of the discal cell, which latter has the appearance of having the upper outer corner cut off by the upper branch.

Length, 10 mm.

Described from one ♂ in the Indian Museum from Gowchar, Nepal.

97. **Chrysopilus cochinensis**, sp. nov.

♀ *Head* with eyes separated by a very broad frons occupying fully half the width of the head, the upper red-brown and lower black facets well demarcated, but of uniform size; frons mainly of uniform width, except for the widening towards vertex, dark brownish yellow, with darker patches; vertex scarcely elevated, ocelli yellowish, prominent;* frons slightly but suddenly depressed just above antennæ, the latter blackish, 2nd joint reddish brown, 3rd joint with a little grey pubescence, arista black; face and cheeks dusted with whitish grey; epistoma brown, covered with whitish dust; proboscis brownish yellow; palpi dark brown, bristly; occiput dark brownish yellow, with sparse short stiff black pubescence; underside of head with a little black softer hair. *Thorax* black, dorsum with short adpressed bright yellow scale-like pubescence; sides brownish grey, with a little yellow pubescence here and there; scutellum brownish grey, with yellow pubescence as on the thoracic dorsum. *Abdomen* dull blackish, barely shining; 1st segment wholly, 2nd, 3rd, and 4th segments on about basal third, with soft white pubescence; black pubescence on the remainder; the 5th, 6th, and 7th segments are suddenly narrowed, their hind borders slightly wider than elsewhere, but the broadest part of the 5th segment is barely half as wide as the 4th segment at base; ovipositor elongate, black; venter black, with a few scattered hairs. *Legs* blackish grey, with a little black pubescence; femora brownish yellow, tips of hind pair slightly blackish; tibiæ and tarsi dirty yellow, apical half of latter blackish. *Wings* very pale yellowish grey, almost clear;

* In the unique type only two ocelli are obvious, the lower one being hidden, except for its extreme upper rim, by an apparently slight distortion of the frons.

stigma dark brown, elongate; both branches of 3rd vein rather broadly but lightly infuscated; an appendix at the fork; halteres yellow, basal half of clubs blackish.

Length, 5½ mm.

Described from a single specimen in the Indian Museum from Parambikulam, Cochin, 16-24. ix. 1914 (*Gravely*).

98. **Chrysopilus birmanensis**, sp. nov.

Very near *C. cochinensis*, differing as follows:—Head bluish ash-grey, except the centre of the frons, which is of the same shade of brown as in *C. cochinensis*; 3rd antennal joint brown, the whitish pubescence rather more conspicuous; occiput with distinct whitish pubescence towards side-margins. Scutellum wholly dead-black, like the thoracic dorsum. Pubescence of abdomen at base of 2nd, 3rd, and 4th segments more golden yellow than whitish. Basal half of anterior femora black. Wing-tip without suffusion; stigma yellowish brown, more diffused, the suffusion not extending below 2nd longitudinal vein.

Described from a unique ♀ in the British Museum from Gokteik Gorge, Northern Shan States, Upper Burma, 26. vii. 1900 (*Col. C. T. Bingham*).

This is remarkably like *C. cochinensis*, and may possibly be a variety of it.

99. **Chrysopilus gravelyi**, sp. nov.

♂ *Head* with vertex prominent, black, ocelli brownish; front of head and epistoma brownish grey; proboscis brownish yellow; palpi dark brown, with concolorous long bristly hairs; antennæ and arista blackish; occiput dark; underside of head with long pale yellow hairs. *Thorax* black and, with scutellum, covered with very short bright yellow adpressed scale-like pubescence; hind margin of scutellum with a row of long black hairs. *Abdomen* black, covered with pubescence like the thorax, which is replaced on the base and hind part of each segment by black hairs, which latter also cover the whole dorsum of the last segment. *Legs* with coxæ dark grey, slightly yellowish in places, with some soft bright yellow hairs towards tips; femora uniformly pale yellow; tibiæ dirty yellow; tarsi brownish towards tips. *Wings* pale grey, iridescent; a darker infuscation at tip from stigma hindwards, reaching inwards sufficiently to fill the 2nd submarginal and 2nd and 3rd posterior cells, the inner outline ill-defined, and a paler space just beyond the elongate dark brown stigma; halteres yellow, knobs black.

Length, 6 mm.

Described from a single ♂ in the Indian Museum from the Darjiling Himalayan Railway, 5500 ft., 23. v. 15 (*Gravely*).

100. **Chrysopilus similis**, sp. nov.

Very near *C. gravelyi*, differing in the 2nd and 3rd antennal joints and the palpi being yellow, not black; labella bright brownish yellow; 1st abdominal segment and base of 2nd yellowish; emarginations of segments yellowish brown; sides of abdomen and venter mainly so also; suffusion at wing-tip lighter and less well defined proximally.

Length, $7\frac{1}{2}$ mm.

Described from a single ♂ in the British Museum from Madulsima, Ceylon, 15. v. 1908 (*T. B. Fletcher*).

101. **Chrysopilus magnipennis**, *Brun.*

Chrysopilus magnipennis, Brunetti, Rec. Ind. Mus. iii, p. 213 (1909).

♀. *Head* mainly brownish yellowish grey, a little darker here and there, especially just above the base of the antennæ; ocellar triangle distinct; antennæ black, the joints subequal in length, 2nd narrowly white at tip, 3rd with grey hair, style long; palpi blackish brown, with brownish-grey dust; proboscis blackish brown, with a few hairs; underside of head with a little black hair. *Thorax* (denuded) black, also at sides; traces of grey hairs and some golden-yellow hairs around base of wings and on scutellum. *Abdomen* black, with moderately close grey hairs, with which are intermixed some golden-yellow ones; venter with grey hairs. *Legs* wholly yellowish, except coxæ, a very narrow ring at base of femora, and the tarsi tips, which are black. *Wings* practically clear; venation as in my *C. segmentatus*, except that the upper branch of the 3rd longitudinal vein takes towards its tip a slight downward curve, thence curving rather sharply upwards to the costa, and enclosing a well-marked, large, dark brown stigma; halteres black, club yellowish.

Length, $4\frac{1}{2}$ mm.; wing, $6\frac{1}{2}$ mm.

Described from a ♀ in my collection from Maskeliya, Ceylon (*E. E. Green*).

102. **Chrysopilus flavopilosus**, sp. nov.

♂ *Head* with eyes contiguous for a considerable space, upper facets dark chocolate-brown, lower ones black; ocellar triangle dark grey, bare except for a few microscopic bristles behind; frons, face, and cheeks, which are very receding, ash-grey, as is also the basal half of the proboscis; palpi brown, with yellow hairs; lower (cylindrical) part of proboscis yellowish or brownish, with a little pale pubescence; antennæ blackish, a little ash-grey about the tips of the joints, arista grey; occiput ash-grey, with some pale pubescence, lower part of head with pale yellow hairs. *Thorax*, with scutellum, blackish grey, wholly covered with very

short, bright golden-yellow, coarse scaly pubescence; pleuræ a little lighter grey, nearly bare; scutellum with long hairs on hind margin. *Abdomen* dark blackish grey (base of 1st segment sometimes lighter); dorsum wholly covered with similar yellow pubescence to that of the thorax, which appears to be sparser along the emarginations of the segments, and with some longer finer black hairs intermixed; venter lighter or darker grey, with sparse pale pubescence; genitalia dark grey, a rather large dorsal plate, a pair of 2-jointed dark grey claspers, brownish yellow towards tips. *Legs* pale or brownish yellow; coxæ dark grey in places, with some pale yellow pubescence; tips of hind femora slightly brownish; tibiæ and tarsi yellowish, tips of tibiæ minutely black, hind tarsi blackish, darker towards tips. A high microscopic power reveals the usual adpressed yellowish scales on all the femora, so pale and closely applied to the surface as to be easily overlooked. *Wings* clear; stigma pale brownish yellow, elongate, distinct, but not sharply defined; halteres rather large and long, brownish yellow with blackish knobs.

Described from a ♂ (*type*) from Almora, Kumaon District, 5500 ft., 29. vi. 1911 (*Paiva*), and another ♂ from Kurseong, 5000 ft., 8. vii. 1908; both in the Indian Museum.

The differences between this species and the European *splendidus*, Mg.,* are as follows:—The coxæ are yellow, the hind pair more or less blackish and bare; in *splendidus* the coxæ are ash-grey, the hind pair bearing long yellow hairs on the apical half. In my species the femora are bright yellow, with minute yellow scales; in *splendidus* they are blackish, with blackish scales. In *flavopilosus* the palpi are thinner and shorter than in *splendidus*, also with fewer and shorter hairs. In *flavopilosus* the first two antennal joints are dark yellowish brown; in *splendidus* they are black.

103. **Chrysopilus yerburyi**, sp. nov.

♂ *Head* with face and proboscis moderately dusted with dark grey, labellæ brownish yellow; palpi brownish yellow, black-tipped; antennal 1st joint blackish, 2nd and 3rd brownish yellow; ocellar triangle distinct; occiput grey, with a little pale hair on lower part. *Thorax* and scutellum black, covered with golden-yellow scaly pubescence; pleuræ grey; humeral region somewhat yellowish. *Abdomen* brownish yellow, hind margin of 2nd and 3rd segments narrowly or broadly, of 4th broadly black, remaining segments all black; the major part of each segment (except perhaps the 1st) from the base apparently covered with golden-yellow scaly pubescence and thin yellow hairs; venter yellow; genitalia black. *Legs* yellow, tarsi darker, tips of hind femora above

* In my note on "? *C. helvolus*, Mg." (Rec. Ind. Mus. vii, p. 464) I used in error the specific name *helvolus* instead of *splendidus*.

with numerous tiny black bristles; coxæ with soft golden-yellow hairs. *Wings* pale yellowish, barely appreciably darker at tips; stigma large, dark brown, well defined; halteres yellow.

Length, 7 mm.

Described from three ♂ ♂ in indifferent condition in the British Museum from Ceylon: Hakgala, 24. v. 1891 (*type*) and 4. v. 1891; Trincomali Hot Wells, 17 viii. 1890 (*Col. Yerbury*).

Two ♀ ♀ in the same collection from Pankullam, 12. iii. 1891, and Hakgala, 13. v. 1891, may represent the other sex of this species.

104. **Chrysopilus albobasalis**, sp. nov.

Head with vertex very prominent, dark grey, with a few bristles behind; the brownish ocelli conspicuous; upper eye-facets bright brown, lower ones very much smaller, dark red; antennæ yellowish, 3rd joint grey-pubescent, arista dirty yellow; frons, cheeks, and epistoma grey-dusted; proboscis brownish yellow, palpi dark brown, both with strong bristles; occiput grey-dusted, nearly bare, lower part of head with some longer pale hairs. *Thorax* and scutellum very deep brown, velvet-like, nearly bare; pleuræ dark grey, sides of scutellum a little yellowish. *Abdomen* with 1st segment black, hind border yellowish, with a fringe of conspicuous soft white hairs; 2nd segment and base of 3rd pale yellowish, former with some conspicuous white hairs; rest of abdomen black or dark brown, dull, with very sparse black hairs; venter coloured as dorsum, but without the white hairs. *Legs* with coxæ black, rest pale yellow; basal half of anterior femora and a ring before the tip of the hind pair, black; tips of tarsi blackish. *Wings* quite clear; a small dark brown well-defined stigma; halteres brownish yellow, clubs blackish.

Length, barely 5 mm.

Described from one specimen from Parambikulam, Cochin State, 1700–3200 ft., 16–24. ix. 1914 (*Gravely*), in the Indian Museum.

The peculiar white base of the abdomen and the entirely clear wings distinguish this species from all the others.

105. **Chrysopilus insularis**, *Sch.*

Chrysopilus insularis, Schiner, Reise Novara, Dipt. p. 199 (1868).

♀ Reddish yellow, the whole upper side deeper, with a pale shimmer towards sides of thorax and the emarginations of the abdominal segments; pleuræ fawn-colour, shining. Ovipositor prominent, the joints indistinct. *Head* black; frons rather broad, very shining, with two shining white spots above the antennæ; occiput dusted with whitish grey; epistoma in middle vesiculose, horn-yellow; antennæ reddish yellow, 3rd joint black, very short, quite round, arista long. Palpi approximated, porrect, reddish yellow, nearly bare, as long as the reddish-yellow proboscis. *Legs* ochraceous yellow, tibiæ and tarsi brown. *Wings* tinged with

brownish yellow, stigma honey-yellow; the two upper veins from the discal cell very approximate at their bases, the upper one a little turned downwards; anal cell closed well before the border.

Length, 8 mm.

Described originally from a single ♀ from Tillangchong, Nicobar Islands.

This species, which has not been seen by me, is said by Schiner to differ from *C. ferruginosus*, Wied., by the absence of the brownish wing-tip and the honey-yellow stigma. The two shining white spots above the antennæ seem characteristic, otherwise the differences from Wiedemann's species appear slight.

106. **Chrysopilus ferruginosus**, *Wied.*

Leptis ferruginosus, Wiedemann, Zool. Mag. i, pt. 3, p. 4 (1819); id., Auss. Zweifl. i, p. 224 (1828).
Heliomyia ferruginea, Doleschall, Nat. Tijd. Ned. Ind. xiv, p. 402, pl. vii, fig. 5 (1857).
Chrysopilus frater, Brunetti, Rec. Ind. Mus. ii, p. 431 (1909).
Chrysopilus ferruginosus, de Meijere, Tijd. v. Ent. liv, p. 287, pl. xviii, fig. 8 (1911).

♂ *Head* with vertex and frons blackish or dark grey, lighter above antennæ, with black hairs on vertex; proboscis and palpi tawny, face below antennæ grey; antennæ brownish yellow, 3rd joint sometimes a little brownish; lower facets of eyes only slightly smaller than upper ones, not always clearly demarcated; occiput blackish, with whitish hair behind eyes. *Thorax* and scutellum light tawny brown, with minute golden-yellow impressed pubescence; sternopleuræ sometimes nearly livid; scutellum with pale yellow hairs on hind border. *Abdomen* light tawny brown to deep orange, darker towards the tips, with yellowish-grey pubescence and some black hairs intermixed; posterior borders of segments (especially the hinder ones) narrowly black; venter similarly marked. *Legs* tawny; coxæ with golden-yellow hairs; tibiæ and tarsi gradually becoming darker and browner up to the tips of latter. *Wings* yellowish grey, sometimes slightly darker towards tips; 2nd posterior cell pointed at base; outer side of discal cell quite straight; stigma dark brown, oval, distinct; costal cell yellowish; halteres yellow, knobs brown.

Length, 10–11 mm.

Described from the two specimens forming the types of my *frater* from Tenasserim and two *ferruginosus* from Batavia, x–xi. 1907 (*Jacobson*), named by Dr. de Meijere; all four specimens in the Indian Museum.

107. **Chrysopilus unicolor**, *Brun.* (Pl. II, fig. 20.)

Chrysopilus unicolor, Brunetti, Rec. Ind. Mus. ii, p. 432, pl. xii, fig. 13 (1909).

♂ *Head* with vertex very small, raised, dark brown; ocelli shining, brownish white, semi-transparent; face grey-dusted;

antennæ, proboscis, and palpi bright tawny brown; upper two-thirds of eyes rich brown, with large facets; lower third black, with very much smaller facets. *Thorax* and scutellum bright tawny brown, with scattered golden-yellow hairs, and with black hairs on the scutellum. *Abdomen* concolorous; bases of segments (except first and second) narrowly brown; the whole abdomen covered irregularly with black hairs, including a row on the posterior border of every segment; venter concolorous, with black hairs. *Legs* (fore pair, except coxæ, missing) uniformly bright tawny brown, practically bare; tarsi darker brown. *Wings* pale grey, almost clear; stigma distinct, but with ill-defined edges; a very light brownish band extending from it posteriorly, partly across the wing; veins tawny brown; halteres tawny.

Length, 5 mm.

Described from one ♂ in the Indian Museum from Margherita, Assam.

108. **Chrysopilus stigma**, *Brun.* (Pl. II, fig. 21.)

Chrysopilus stigma, Brunetti, Rec. Ind. Mus. ii, p. 432, pl. xii, fig. 14 (1909).

♂ *Head* with vertex reduced to a very small elevated black triangle, on the angles of which are the three prominent ocelli; eyes dark reddish brown, contiguous for a considerable distance, the facets much larger for a considerable space in front above the antennæ, with a greenish-black tinge and (in certain lights) a narrow, bright green, horizontal stripe across the middle; face much withdrawn between the eyes, light grey above and below antennæ; antennæ yellow, 3rd joint blackish, with some hairs and a rather long arista, which is microscopically pubescent; proboscis cinereous grey, lower part tawny yellow; the palpi tawny yellow, with tips broadly black and hairy; a fringe of light hairs around the eyes; back of head light grey. *Thorax* greenish, with a dorsal narrow brown stripe in front and two small indistinct brown spots in middle of dorsum; sparse yellow hairs over the whole dorsum; sides of thorax cinereous grey, yellowish at base of wing; scutellum grey; centre with a slight greenish tinge. *Abdomen* yellowish, 1st segment blackish grey, segments 2, 3, and 4 with a blackish, rather wide posterior border and dorsal stripe, remainder of segments blackish; venter yellow, tip blackish; a few yellow hairs scattered over dorsum of abdomen, black hairs at tip; genitalia bi-lobed, tawny yellow, with stiff black hairs. *Legs* with coxæ and femora pale yellow, with a few yellow hairs near the tip on underside of latter, and with generally distributed microscopic black hairs; tibiæ blackish yellow, with microscopic black hairs and some stronger bristles; tarsi similar, tips black; middle tarsi with two long spines at tip. *Wings* quite clear; stigma distinct, dark brown, but without well-defined limits; traces of a pale yellowish stripe towards tip of wing. Inner cross-vein placed before one-fifth of the discal

cell; anal cell closed well before wing-border; halteres yellow, knobs black.

Length, 5–6 mm.

Described from a single ♂ in the Indian Museum from the base of the Dawna Hills, Lower Burma, 2. iii. 1908 (*Annandale*).

109. **Chrysopilus latus**, sp. nov.

♀ *Head* with frons yellowish grey, one-fifth of the head in width just above antennæ, slightly broader on upper part; the brownish ocelli on an elongate, barely elevated tubercle; frons whitish immediately above base of antennæ; antennæ blackish, 2nd joint yellowish, arista black; proboscis yellowish, with soft short pale hairs; palpi brownish yellow, pubescent; occiput grey, with short sparse bristly black hairs. *Thorax* yellowish brown; two narrow whitish well-separated median lines and the whitish edges of the dorsum give the appearance of three almost contiguous yellowish-brown stripes; traces of short golden-yellow pubescence towards sides and hind margins; pleuræ grey-dusted; scutellum yellowish brown, with traces of yellow pubescence. *Abdomen* dark chestnut-brown; 1st segment wholly, 2nd, 3rd and 4th segments with hind margins broadly and rather irregularly yellow; remaining segments much contracted, yellow; ovipositor brownish yellow, with two small terminal yellow lamellæ; venter similar to dorsum, both surfaces with limited short dark brown pubescence; some pale finer hairs towards sides of 1st segment. *Legs* with coxæ brownish yellow; femora yellow, hind pair a little darker above towards tips; tibiæ dirty yellow; tarsi brown, black at tips. *Wings* pale yellowish grey; stigma large, dark brown, not clearly outlined; halteres brownish yellow, knobs more or less darkened.

Length, 5½ mm.

Described from a single ♀ in the Indian Museum from Guindy, Madras.

110. **Chrysopilus sordidus**, sp. nov.

♀ *Head* with frons practically parallel-sided as far as antennæ, one-fourth width of head, dusted with light grey dust; ocelli and ocellar triangle darker; face and proboscis grey-dusted, former with soft whitish hairs near eye-margins; labella brownish yellow, palpi rather darker; antennal 1st joint blackish, 2nd and 3rd brownish yellow, arista black; occiput grey-dusted, with some whitish hairs. *Thorax* rather dark brown, with two well-separated narrow indistinct grey dorsal stripes and short whitish sparse pubescence; scutellum concolorous, with similar pubescence; metanotum dark brown; pleuræ moderately dark grey. *Abdomen* dark brown, hind margins of 1st and 2nd segments broadly, and of the remaining segments narrowly, yellowish; some whitish pubescence, more conspicuous at sides; venter dark brown, base

yellowish, hind margins of segments narrowly yellowish; genitalia yellow, with two rather exposed terminal lamellæ. *Legs* yellowish; coxæ, femora (except base and tips), tips of hind tibiæ broadly and all tarsi (except base of middle pair) dark brown. *Wings* grey; two slightly darker streaks over the "cross-veins"; stigma large, dark brown; halteres large, dirty yellow.

Length, 5 mm.

Described from a single ♀ in the British Museum in fair condition from Naini Tal, 7000 ft., vi. 1900 (*Lt.-Col. Giles*).

A rather thick-set species.

A ♀ taken by Mr. T. B. Fletcher may be this or a very closely allied species, differing in possessing distinctly longer, wholly blackish-grey antennæ, no signs of yellowish margins to abdominal segments, and being wholly more grey than yellowish; Hazara District, Dungagali, 8000 ft., 21–24. v. 1915.

111. **Chrysopilus alternatus**, sp. nov.

♂ *Head* with the lower and hinder facets of eyes slightly smaller than front ones, but not sharply demarcated and of the same dark brown colour; vertical triangle small, blackish, ocelli inconspicuous; frons and front of head greyish; antennæ bright yellow, 1st joint greyish, arista black; epistoma blackish; proboscis and palpi bright yellow, with some soft hairs; some pale yellow hairs on inner side of head; occiput grey, with short hairs towards margin. *Thorax* and scutellum yellowish brown, with short, rather coarse, bright yellow pubescence; pleuræ greyish. *Abdomen* with 1st segment and base of 2nd yellowish; of the remainder, rather more than basal half of each blackish brown, the remaining part yellowish; the whole dorsum with short pale yellow hairs; venter similar. *Legs* yellow, tibiæ and tarsi very slightly but uniformly duskier. *Wings* pale yellowish grey; stigma large, dark brown, its outline not clearly defined; halteres yellow, knobs brownish.

Length, 8 mm.

Described from a single ♂ in the Indian Museum from Guindy, Madras; and two subsequent specimens from Coonoor, 5. ix. 1911 (*Fletcher*); and Lebong, 4500 ft., 2–9. vi. 1909 (*Howlett*).

Family NEMESTRINIDÆ.*

Head transverse, as wide as or a little narrower than thorax, set close upon it; eyes generally widely separated in both sexes, but in some cases narrowly separated or contiguous for some distance in ♂ and then only narrowly separated in ♀, generally bare, occasionally with dense or long pubescence; facets generally of uniform size; three ocelli. Proboscis varying from very long (porrect or bent down) to very short and thick; labella variable

* This family has occasionally been called the *Hirmoneuridæ*, but the claims of the title here retained have been fully established.

in size; palpi 1- to 3-jointed, often indistinct. Antennæ remote at their bases, small; the two basal joints with stiff hairs, 3rd barely longer, onion-shaped or pointed, with a long bristle-like, generally 2-pointed style, which is longer than the antennæ, and sometimes pointed at tip.

Thorax approximately quadrate, humeri inconspicuous, scutellum oval, variable in size, unarmed.

Abdomen comparatively short, a little longer or shorter than and about as wide as the thorax.

Legs comparatively slender, moderately long; tibiæ unspurred; three pulvilli, slightly variable in form, claws long.

Wings of moderate size, often narrowed and elongate, always with very characteristic venation, all the veins in the distal half of the wing being practically parallel with its longitudinal axis, except the so-called "diagonal vein," and all the veins ending above the wing-tip, except the tips of two or three. This peculiar venation gives a general resemblance to that of the MYDAIDÆ, but there is no close affinity between the two types. Auxiliary and 1st longitudinal veins long and straight, ending towards wing-tip; præfurca very short, beginning a little before middle of wing, 2nd and 3rd veins diverging almost immediately; 2nd nearly straight, undulating, simple, but sometimes joined by an additional veinlet to upper branch of 3rd vein (*Fallenia*, *Nemestrina*); 3rd vein projected diagonally and turning up suddenly before or at about half its length, shortly afterwards forked, the branches either parallel (*Nemestrina*, *Hirmoneura*, *Rhynchocephalus*) or widely open, reuniting to form a small subtriangular cell (*Fallenia*). Anterior cross-vein absent, as the 3rd and 4th veins always anastomose at that spot* (*i. e.* at about two-thirds the length of the discal cell); 4th vein with upper branch forked, the two prongs parallel and ending above wing-tip; lower branch ending in (or united with) upper branch of 4th vein (just before it forks) at distal angle of discal cell; posterior cross-vein normally present (absent in *Fallenia*); 5th vein forked, both branches forming rather pronounced curves; upper one joining upper branch of 4th vein between its upper and lower prong, thence diverging and running for the very short remaining space to the wing-margin; lower branch of 5th vein turning down to wing-margin after quitting posterior cross-vein, sometimes meeting anal vein, closing anal cell; anal vein undulating; axillary vein short or rudimentary. First basal cell long, narrow, pointed at the tip; 2nd broader, shorter, roughly speaking three-sided; anal cell long, narrow, open or closed just before wing-margin; two submarginal and four or five posterior cells, 4th always closed. There is an apparent vein running diagonally across the wing, beginning with the præfurca and ending in the hind margin of

* I am not quite sure about this point. Even if a short cross-vein occurs here I do not think it is the anterior cross-vein, but an entirely supernumerary vein. (See notes under *Lasia* in CYRTIDÆ.)

the wing some distance before wing-tip. This is no real individual vein, but is composed of the præfurca, the basal portion of the 3rd vein up to its junction with the 4th, the outer side of the discal cell (upper branch of 4th vein), the continuation of the same branch and, finally, the united ends of the lower branch of the 4th vein and upper branch of 5th vein. The last two sections of this "diagonal" vein (as it is conveniently called) are occasionally joined by a very short veinlet, which may be regarded as the upper prong of the lower branch of the 4th vein. It has no parallel in any other family of Diptera. Additional veinlets occur in some genera and species connected with the 3rd vein, the exact identification of which is perhaps unimportant, especially as no such cases are known amongst Oriental species. In *Nemestrina*, a non-Oriental genus, but one which may possibly occur in India, the most characteristic venation in the family is reached, presenting a curious, somewhat dragonfly-like network of veins, owing to all the spaces between the 2nd vein and the lower prong of the upper branch of the 4th vein containing a number of transverse veinlets, dividing that part of the wing into a considerable number of small squares. A few similar additional veinlets occur between the lower branch of the 4th vein and the wing-margin.

Life-history. Larva amphipneustic; head very small, retractile; twelve body-segments; posterior spiracles terminal, well separated, placed in a transverse fissure. Of the only species of which the life-history is known, a *Hirmoneura*, the larva is parasitic on the early stages of the common European beetle, *Rhizotrogus solstitialis*.

This family is sometimes divided into two subfamilies, (1) the NEMESTRININÆ, with a very long proboscis and short palpi, and (2) the HIRMONEURINÆ, with a very short proboscis, to which character Verrall adds "palpi very long and upturned," but this latter does not hold good. The erection of subfamilies therefore merely on the length of the proboscis does not seem advisable. In any case all the Oriental genera would fall in the HIRMONEURINÆ.

Table of Genera.

1. Ocelli present	2.
Ocelli absent (auxiliary vein very short, not extending much beyond origin of 4th vein)	[p. 154. ATRIADOPS, Wand.,
2. Palpi moderately long, and with mouth-opening always obvious (auxiliary vein nearly as long as 1st vein) . . .	[p. 147. HIRMONEURA, Mg.,
Palpi, proboscis, and mouth-parts wholly indistinct	3.
Auxiliary vein united to 1st longitudinal until beyond middle of wing. .	[p. 153. TRICHOPSIDEA, Westw.,
Auxiliary vein distinctly separate, nearly as long as 1st longitudinal.	[p. 155. CEYLONIA, Licht.,

Genus **HIRMONEURA**, *Mg.*

Hirmoneura, Meigen, Syst. Besch. ii, p. 132 (1820); Blanchard, Hist. Nat. Ins. iii, p. 587 (1840).
Hyrmoneura, Rondani, Archiv. Zool. Modena, iii, p. 50 (1863).
Hyrmophlœba, Rondani, *op. cit.* p. 51 (1863).
Hermoheura, Philippi, Verh. z.-b. Ges. Wien, xv, p. 655 (1865).
Parasymmictus, Bigot, Bull. Soc. Ent. France, (5) ix, p. lxvii (1879).

GENOTYPE, *Hirmoneura obscura*, Mg. (Europe); by original designation.

Whole body of about uniform width. *Head* transverse; eyes bare or pubescent, in ♂ contiguous, in ♀ wide apart, or distinctly though narrowly separated in ♂, in which case they are less widely separated in ♀; three ocelli. Proboscis very short, hardly extended beyond mouth-opening; palpi moderately long, curved

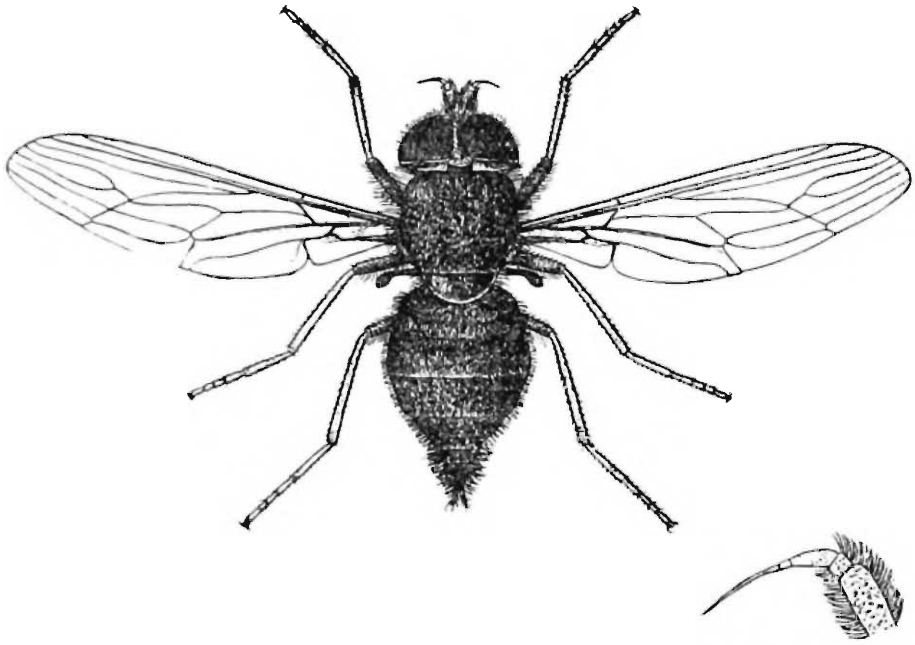

Fig. 9.—*Hirmoneura opaca*, Licht., and enlarged figure of antenna.

upwards. Antennæ short, porrect, remote at base, 3-jointed, 1st and 2nd subglobular or cylindrical, subequal in length, 3rd onion-shaped, longer, produced in a long arista-like style longer than the antennæ. *Thorax* subquadrate. *Abdomen* rather longer than thorax, the tip pointed in both sexes, more so in ♀; whole body and legs devoid of any strong bristles, but bearing longer or shorter soft pubescence of varying extent. *Legs* moderately long, slender, minutely pubescent. *Wings* moderately or rather long; auxiliary, 1st, and 2nd longitudinal veins long, ending towards wing-tip; 2nd beginning about or before middle of wing, nearly straight; 3rd beginning near base of 2nd, projected diagonally across the wing, anastomosing (even if only in a punctiform manner) with 4th, thence bent suddenly upwards, shortly afterwards forking, the branches long and approximately parallel,

gently curved; 4th vein forked; upper branch again forked, the branches straight, parallel with those of 3rd vein and with hind margin of wing; lower branch forming basal and lower sides of discal cell, meeting upper branch and thence turning down to the hind margin, receiving the upper branch of the 5th vein just before; 5th vein forked; posterior cross-vein technically present but very short. Two submarginal and five posterior cells, 4th always closed; a discal cell, wider at base than tip, elongate; 1st basal cell reaching nearly to tip of discal; 2nd basal long; anal cell long and narrow, open. Squamæ small.

Range. Central and South Europe, North, Central, and South America, South Africa, Central Asia, the Orient, and Australasia.

Life-history. This is known to some extent of *H. obscura*, Mg., a European species, as described by Handlirsch.* The eggs have been found in holes in the bark of silver firs, and the fully developed larva has been found in the pupa of a beetle, *Rhizotrogus solstitialis.* The larvæ resemble those of the LEPTIDÆ.

As regards the spelling of the generic name, *Hermoneura* has been suggested, but "Dr. A. W Verrall is of opinion that *Nemestrina* and *Hirmoneura* are so impossible as Greek compounds as to be beyond correction" (G. H. Verrall).

Table of Species.†

1. Eyes bare	2.
Eyes pubescent ‡ . .	3.
2. Legs all yellowish; eyes narrowly separate in ♂	*annandalei*, Licht., p. 149.
Hind tibiæ and tarsi dark brown; eyes contiguous in ♂	*basalis*, Licht., p. 149.
3. Legs black (tibiæ with thick brownish pubescence).	*opaca*, Licht., p. 150.
Legs principally yellowish	4.
4. Smaller species; 11–12 mm.	5.
Larger species; 16–20 mm.	6.
5. Small grey species with abdominal bands of pubescence	*cingulata*, Licht., p. 151.
Larger coffee-brown, rather bare species	*brunnea*, Licht., p. 151.
6. Eyes with yellow hair	*ochracea*, Licht., p. 151.
Eyes (presumably) with black or dark brown hair	7.
7. Body deep dark brown, with longer woolly pubescence	*austeni*, Licht., p. 152.
Body coffee-brown, rather bare	*coffeata*, Licht., p. 152.

* Wien. Ent. Zeit. i, p. 224, and ii, p. 11 (1882, 1883).

† It has been difficult to draw up a satisfactory table owing to the close affinity of all the species, and from my knowledge of most of them being limited to German descriptions. In the case of the eight species included herein, *annandalei*, *cingulata*, and *basalis* are redescribed from Indian Museum specimens (all seen by Lichtwardt), that author's descriptions being also incorporated. The descriptions of the remaining species are the best translations of Lichtwardt I can offer.

‡ Presumably; no definite statement is given in the descriptions of *coffeata* and *brunnea*.

112. Hirmoneura annandalei, *Licht.*

Hirmoneura annandalei, Lichtwardt, Rec. Ind. Mus. ix, p. 333 (1913).

♂ ♀ Very like *H. cingulata* in size and colour, but separated from all other species except *H. basalis* by the bare eyes. *Head* with frons hardly narrower in ♂ than ♀, more than twice as wide at level of antennæ (where it forms a little more than one-fourth the width of the head) than at vertex; frons with long soft black hairs, face with yellow hairs; antennæ and proboscis both bright yellow; sides of face narrowly yellow. *Thorax* blackish, with blackish pubescence in middle of disc, yellowish and thicker on anterior margin and towards sides, on shoulders, and in front of and just below wing-base; soft yellow pubescence on sides of thorax and scutellum; metanotum pale grey. *Abdomen* with black anterior half and slate-grey hinder half of 1st segment; remainder of segments blackish; 1st segment with black hairs on the black part and thin pale yellowish hairs on the slate-grey part; remainder of segment with thick, long, bright yellow pubescence on anterior half and shorter black pubescence on hinder half; venter blackish, with short uniform pale yellow pubescence, hind margins of segments yellowish. *Legs* entirely bright yellow. *Wings* grey, anterior border brownish; halteres blackish brown.

Length, 11–13 mm.

Described from several of each sex in the Indian Museum from Simla, 7000 ft., 9. v. 1910 and 16. v. 1910 (*Annandale*), 3. v. 1914 and 29. v. 1914 (*Capt. Evans*); Kufti, Simla Hills, 11. v. 1909 (*Annandale*); Kufti to Phagu, 21. v. 1916; Mahabaleshwar, Satara Distr., 4200 ft., 13–16. iv. 1912 (*Gravely*).

This species is extremely like *H. cingulata*, but in addition to the bare eyes it may be recognised by the black hairs on the abdomen being much shorter than the yellow ones, whereas in *H. cingulata* they are nearly or quite as long as the yellow ones.

In the present description of this species I have incorporated Lichtwardt's main characters.

113. Hirmoneura basalis, *Licht.*

Hirmoneura basalis, Lichtwardt, Deut. Ent. Zeits. p. 595, fig. 3 (1910); id., Rec. Ind. Mus. ix, p. 333 (1913).

♂ *Head* with eyes bare, closely contiguous for a considerable distance, leaving a grey frons of the shape of an isosceles triangle, covered with long black pubescence; vertex reduced to the very small ocellar tubercle, with a few black hairs; face blackish, with yellow margins and pale yellowish hairs; blackish hairs round base of antennæ; latter yellowish brown, basal joint with long stiff black hairs, 3rd joint onion-shaped. *Thorax* greyish brown, shortly pubescent at sides; on breast the hairs more greyish white; scutellum with dense yellowish-brown pubescence. *Abdomen* characteristically coloured; anterior half of 1st segment

black, hind half of 1st and anterior half of 2nd ivory-white, with pale yellowish-white pubescence; remaining segments cinnamon-brown, with short blackish-brown pubescence; a little yellowish or whitish pubescence at sides of abdomen from 4th segment to tip; venter reddish brown, with some short yellowish pubescence. *Legs*: anterior pairs wholly brownish yellow; hind femora brownish, hind tibiæ and tarsi dark blackish brown. *Wings* pale brownish grey, darker anteriorly; venation typical, as in *H. obscura*, Mg.

Length, 16 mm.

Described originally by Lichtwardt from a type ♂ in his collection, which, purchased from a dealer, bore the label "Ecuador, iii. 1899." This author subsequently received from the Indian Museum for examination the ♂ specimen from which the above description is drawn up—from the Dawna Hills, Burma, 2000–3000 ft., 3. iii. 1908 (*Annandale*).

Type in Herr Lichtwardt's collection.

114. **Hirmoneura opaca**, *Licht.* (Pl. II, fig. 22.)

Hirmoneura opaca, Lichtwardt, Deut. Ent. Zeits. p. 643, ♀ (1909); id., Rec. Ind. Mus. ix, p. 334, ♂ (1913).

♂ ♀ An obscure, blackish, grey-dusted species, with thin soft grey pubescence. *Head* with eyes dark brown, pubescent; frontal stripe in ♀ not at all broad, barely wider above antennæ than at vertex, with thick black pubescence, which is longest above antennæ; proboscis, palpi, and antennæ black, 1st and 2nd joints of latter grey-dusted and with yellowish-grey hairs; similar hairs on epistoma, underside of head, and sternum. *Thorax* with the pubescence more yellowish and longer at the sides; entire dorsal surface with soft greyish blue hoary dust. *Abdomen* with a hardly discernible pattern on the middle of each segment, consisting of a central spot and two oblique lateral spots of a dull blackish-grey colour; ovipositor rather long, with pale hairs. *Legs* black; tibiæ, especially hind pair, with such dense bright brown pubescence, that they appear brown. *Wings* with a blackish tinge and a brownish shading on anterior border.

Length, 15 mm.

Described originally from a single ♀ from the Kangra Valley, N.W Himalayas, 4500 ft., xi. 1899 (*Dudgeon*). Further notes and the ♂ described by Lichtwardt in the Rec. Ind. Mus. (*l. c.*). Several specimens are in the Indian Museum from Mussoorie, the Kangra Valley, 4500 ft., xi. 1899 (*Dudgeon*), and Simla, but are in very bad condition, nearly all appear to have been immersed in spirit; it also occurs at Dehra Dun, x. 1911 (*Howlett*).

Type in the British Museum.

The above description is almost entirely Lichtwardt's.

115. Hirmoneura cingulata, *Licht.*

Hirmoneura cingulata, Lichtwardt, Deut. Ent. Zeits. p. 644, ♀ (1909); id., Rec. Ind. Mus. ix, p. 333, ♂ (1913).

♂ ♀ A small grey species with abdominal bands. *Head* with eyes thickly pubescent, especially in ♂, narrowly separated in ♂; frons scarcely wider in ♀, bearing sparse black hair, around the antennal base with thicker yellowish-grey hair; antennæ, palpi, and legs all yellowish red,* tarsi hardly darker. *Thorax* blackish, with grey pubescence, which at the sides is longer and more yellowish. *Abdomen* with basal part of 1st segment dark brownish, apical part pale slate-grey; rest of segments grey, with thin yellow pubescence and brown margins; in the ♂ the rows of abdominal pubescence are more erect and prominent, forming in both sexes on the side-margins almost bunches of yellow and black hairs intermixed. *Wings* grey, light brown anteriorly; halteres blackish brown.

Length, 11–12 mm.

Described originally from the ♀ sex only from India; the ♂ subsequently described from two specimens from Phagu, Simla Hills, 9000 ft., 12. v. 1909.

Type (♀) in the British Museum, from the Saunders collection; of the ♂ ♂ referred to, one is in the Indian Museum.

The above description is mainly Lichtwardt's, to which I have added a note or two from the Indian Museum specimen.

116. Hirmoneura brunnea, *Licht.*

Hirmoneura brunnea, Lichtwardt, Deut. Ent. Zeits. p. 645, ♀ (1909).

♀ Near *H. coffeata*, possibly a seasonal form of it.

In this species the wings are proportionately much shorter, being only 11 mm. long to a body of 11 mm., plus ovipositor of 2 mm. to 3 mm. Apart from the difference in the proportions, the characters are mainly as in *H. coffeata*; the pubescence on the sides of the thorax and at the base of the abdomen is yellow, not pale brown; legs all yellowish red; wings rather duller in colour, and the fore border darker.

Described by Lichtwardt from a single ♀ in the British Museum from Trincomali, Ceylon, 3. iv. 1892 (*Col. Yerbury*).

117. Hirmoneura ochracea, *Licht.*

Hirmoneura ochracea, Lichtwardt, Deut. Ent. Zeits. p. 643, ♂ (1909).

♂. Very near *H. austeni*. Body pale brown, with short velvety yellow pubescence, which is longer behind the scutellum and at the base of the abdomen. Eyes with distinctly yellow hairs,

* According to Lichtwardt; I call the legs bright yellow, as in *H. annandalei*.

closely contiguous, so that only a very small frons remains, which latter is clothed with yellow ochre and dark brown hairs intermixed. Antennæ brownish; eye-margins bent, reaching to base of antennæ. Legs wholly yellow ochre. Wings yellowish grey, fore border yellow ochre.

Length, 18 mm.

Described by Lichtwardt from a single ♂ from the Tau Plateau, Burma, 4000 ft., ii. 1890 (*Col. C. T. Bingham*).

Type in the British Museum.

118. **Hirmoneura austeni**, *Licht.*

Hirmoneura austeni, Lichtwardt, Deut. Ent. Zeits. p. 643, ♂ (1909).

♂ A large robust species. Body deep dark brown, evenly clothed with long, erect, woolly, pale brown pubescence, which is thicker on the sides of the thorax and abdomen, where in certain lights it has a kind of bronze tinge. Head semicircular; eyes closely hairy; frons broad, forming one-sixth the width of the head with dense deep black pubescence; epistome a little broader, black, with concolorous pubescence; a few light brown hairs only about the mouth-opening and around the short proboscis; antennæ and palpi black; the latter curving upwards, lying close along the eye-margins and reaching to base of antennæ. Lower surface of head and sternum with yellowish hair; venter with yellowish pubescence; the extreme base of abdomen with a narrow band of deep black hairs. Legs stout, reddish yellow; anterior femora brownish, with dense pale pubescence, which makes them appear even thicker. Wings brown, anteriorly darker.

Length, 18–20 mm.

Described by Lichtwardt from five ♂♂ in the British Museum from the Khasi Hills, Assam.

119. **Hirmoneura coffeata**, *Licht.*

Hirmoneura coffeata, Lichtwardt, Deut. Ent. Zeits. p. 644, ♀ (1909).

♀ A large species with coffee-brown body, rather bare, with some pale brown pubescence only on sides of thorax between the shoulder and wing-base; underside of thorax with patches of pale hairs above the front coxæ and under the wing-base; everywhere else, including the venter, only very thinly pubescent. The pubescence on frons rather longer, and towards vertex it is blackish brown, at base of abdomen a narrow band of all black hairs. Wing surface uniformly coffee-brown, with bronze and cinnamon-brown reflections; alulæ very reduced so that the wing is almost clavate; legs paler brown than the body.

Length, 16 mm. + ovipositor 4 mm.; wing, 24 mm., breadth of wing, $5\frac{1}{2}$ mm.

Described by Lichtwardt from a single ♀ from Rambodde, Ceylon (*Nietner*).

Type in the Berlin Museum.

Genus **TRICHOPSIDEA**, *Westw.*

Trichopsidea, Westwood, Trans. Ent. Soc. Lond. ii, p. 151, pl. xiv (1836); Macquart, Dipt. Exot. ii, pt. 1, p. 397, pl. iii, fig. 1 (1840);* Wandolleck, Ent. Nach. xxiii, p. 250 (1897).

GENOTYPE, *Trichopsidea œstracea*, Westw.; by original designation.

Of the normal Nemestrinid type; the species smaller than those of *Atriadops*, with exceptionally long wings, allied to *Trichophthalma* and *Megistorhynchus*. Three ocelli on a small conical tubercle; epistome Œstrid-like, mouth-parts very reduced and indistinct, mouth itself very rudimentary; abdominal segments puffed up; genitalia in male clubbed; ♀ unknown. First and last tarsal joints each as long as the other three together. Auxiliary and 1st longitudinal veins apparently united until beyond middle of wing, the former then turning up to costa rather suddenly; upper branch of 3rd vein turned up suddenly, meeting 2nd vein about its middle; both branches of 4th vein apparently united at tip of discal cell, upper branch either single or, if forked, the lower prong may consist also of the tips of both the lower branch of the 4th vein and upper branch of the 5th. If this reading of the veins be correct there is a somewhat long posterior cross-vein. Anal cell open, axillary vein and squamæ absent.

Range. Except *dohrni* from the Andamans and Sumatra, the only other known species (*œstracea*, Westwood) is from Australasia.

120. **Trichopsidea dohrni**, *Wand.*

Trichopsidea dohrni, Wandolleck, Ent. Nach. xxiii, p. 251, figs. 7, 8 (1897); Lichtwardt, Deut. Ent. Zeits. p. 648 (1909).

♂ Ground-colour reddish brown, with not very reddish-yellow hairs. *Head* rather broader than thorax, shining golden brown; eyes contiguous below vertex, upper facets much larger than lower ones; three yellowish-brown ocelli on prominent vertical tubercle, with black and reddish-brown hairs; epistome Œstrid-like, with thick reddish-brown pubescence; antennæ 3-jointed, 3rd joint rod-shaped, with undulating outline; at tip with some very short fine pellucid hairs; mouth-opening indistinct. *Thorax* brown, with fine velvet-like tomentum, showing several darker and lighter indistinct longitudinal stripes; in front and at sides with long thick reddish-yellow pubescence; scutellum pale brown, anterior margin darker; squamæ absent; halteres greenish yellow. *Wings* pale yellowish brown, with six clear-cut hyaline spots, which in certain lights show a pearly lustre; 1st longitudinal vein present; anal vein absent. *Abdomen* yellow, with velvet tomentum; 1st segment pale yellowish, 2nd with a pale

* Macquart's figure shows the broad elongate-conical labrum; the longer, concave, round-tipped labium; and the long filamentous organs, all as described by Westwood, who assumed the latter to be "analogous to palpi" and stated that the mouth was rudimentary and concealed. Wandolleck also describes the mouth as rudimentary.

band interrupted in middle and with two pale side-spots; these spots occur on each succeeding segment also, and are visible, with the interrupted band, through absence of tomentum; venter pale yellowish red, with a darker mark at sides of each segment. *Legs* with coxæ, trochanters, and femora of both anterior pairs yellowish red, with moderately long concolorous pubescence; tibiæ fawn-yellow with reddish-brown tips; hind femora long, thin basally, thence distinctly clubbed; the thin part fawn-coloured, the clubbed part reddish yellow; last tarsal joint and pulvilli reddish yellow, the other joints fawn-colour with darker tips; claws dark brown.

Length, 10 mm; wing, 11·4 mm.

Described by Wandolleck originally from a type ♂ from Sumatra, and Lichtwardt subsequently recorded another ♂ from Ross I., Andaman Is., v. 1904 (*Col. C. T. Bingham*).

Type in Herr Dohrn's collection at Stettin; the second specimen in the British Museum.

Genus **ATRIADOPS**, *Wand.*

Atriadops, Wandolleck, Ent. Nach. xxiii, p. 245 (1897).
Colax, Wiedemann (*nec* Hübner, 1816), Analec. Ent. p. 18, pl. i, fig. 8 (1824); id., Auss. Zweifl. ii, p. 260, pl. ix, fig. 11 (1830); Macquart, Dipt. Exot. ii. pt. 1, p. 34, pl. iii, fig. 2 (1840); Westwood, Cab. Orient. Entom. p. 38, pl. xviii, fig. 5 (1847); Walker, Ins. Saund., Dipt. pl. v, fig. 4 (1850).

GENOTYPE, *Colax javana*, Wd., or *C. macula*, Wd.*

Moderate-sized species with peculiar tomentose-like pubescence and dark-coloured and spotted wings. Epistome Œstrid-like; eyes in ♂ subcontiguous for a short space; ocelli absent; proboscis not obvious, if projecting from mouth-opening, hidden in the long hair of the face; antennæ 3-jointed, much as in *Hirmoneura*. Thorax subquadrate, rather broader than long; abdominal segments somewhat puckered-up just before the hind margins, forming a blunt ridge; genitalia in ♂ short, tip with a broader base, in ♀ longer with sabre-shaped lamellæ. Hind femora slightly thicker; first and last tarsal joints each as long as remaining three together. Wings with auxiliary vein short, ending free at about opposite origin of 4th vein; 1st longitudinal and greater portion of vein "diagonal" considerably thickened; 3rd vein forked; 4th vein forked, anastomosed as usual for some distance with 3rd; lower prong of upper branch not always reaching wing-margin;† anal cell open, axillary vein present; thoracic squamæ well developed; two submarginal and four posterior cells, 1st sometimes divided

* Both originally described together on the same page. I cannot personally decide and have seen no species set up as genotype.

† It does not do so in the one example of *A. javana* that I have seen, but Wandolleck figures it running to the wing-margin, with also a short cross-vein between it and the vein in front (Ent. Nach. xxiii, p. 246, fig. 1, 1897).

by a cross-vein, 3rd closed; discal cell sometimes narrowly open;* anal cell open.

Range. The very few species known come from China, Brazil, Ceylon, Sumatra, Java, and South and West Africa.

121. **Atriadops javana**, *Wied.*

Colax javana, Wiedemann, Analec. Ent. p. 18 (1824); id., Auss. Zweifl. ii, p. 261 (1830).

Atriadops javana, Walker, Ins. Saund., Dipt. pl. v, fig. 4 (1850); Wandolleck, Ent. Nach. xxiii, p. 246, fig. 1 (1897).

♂ *Head* with eyes contiguous for a short space; frons pale brownish grey, with greyish-white hairs; antennæ pale brownish yellow. *Thorax* (?) blackish (discoloured, probably brownish in life), sides with longer whitish-grey hairs. *Abdomen* brighter brown, each segment towards hind border drawn up slightly, forming a slight ridge; anterior half of each segment with fine golden-grey pubescence, which towards sides becomes longer, thicker, and whiter, and laterally on the hind margin of each segment is some long black pubescence. *Wings* dark brown, the darker parts blackish, hind margin rather broadly greyish, except at extreme wing-tip, at tips of lower prong of upper branch of 4th vein, tips of both branches of 5th vein, two or three intermediate spots situated rather close together, and at tips of anal and axillary veins, at each of which is a small blackish-brown spot; similar dark spots occur on the distal side of the diagonal veins, at the juncture of the veins, and larger ones at the forking of both 4th and 5th veins; at the distal end of the 2nd basal cell is an ill-defined clearer space, and a similar subtriangular one extending from the 3rd vein just before it meets the 4th, which, inclining distally and diagonally, nearly reaches the costa. Thoracic squamæ considerably developed, with long greyish fringe.

Length, 8 mm.

Re-described from a single ♂ in the Indian Museum from Trincomali, Ceylon, 10. ix. 1909 (*Col. Yerbury*), presented by Herr Lichtwardt, the species having been originally described from Java.

Genus **CEYLONIA**, *Licht.*

Ceylonia, Lichtwardt, Deut. Ent. Zeits. p. 646 (1909).

GENOTYPE, *Ceylonia magnifica*, Licht.; by original designation.

Body robust, linear. Proboscis hidden by the long hair of the face; palpi small, thin;† epistome pointed, as in *Trichopsidea*,

* In Wandolleck's figure of *A. macula*, Wd. (*l. c.* p. 247, fig. 2), a Brazilian species, the discal cell is prolonged narrowly to the wing-margin, remaining open through the failure of the lower branch of the 4th vein to meet the lower prong of the upper branch. The species seems abnormal, as the 2nd longitudinal vein is either absent or the 3rd vein must be unforked. Also in the basal angle of the last posterior cell is a very small quadrate additional cell.

† I follow Lichtwardt in stating that the face has long hair, but I have not noted this fact in describing my *nivea*. In any case in my type of that species the palpi are perfectly obvious.

Dicrotrypana, and *Symmictus*. Eyes in ♂ contiguous for some distance, upper facets larger than lower ones; vertex very small, three ocelli on small prominent tubercle. Antennæ short, of normal Nemestrinid type; 1st joint cylindrical, 2nd half as long as 1st, 3rd globular, with apical bristle longer than the whole antenna. Wings with auxiliary and 1st longitudinal veins very long, straight, close together, ending at a little distance before wing-tip; 2nd vein beginning at half the wing's length, straight; 3rd beginning immediately afterwards, projected diagonally downwards, anastomosing as usual with 4th vein, forking shortly beyond; 4th vein with upper branch forked, the branches of 3rd and 4th veins all parallel with 2nd vein and with hind margin of wing; all ending above wing-tip, except the lowest, which ends exactly there; lower branch joining upper one just before forking of latter; 5th vein rather peculiarly forked, so that the shape of the last posterior cell at base is that of a slightly curved cone; posterior cross-vein absent; anal cell open, axillary vein long. Two submarginal and five posterior cells, 4th closed.

122. **Ceylonia magnifica**, *Licht.* (Pl. II, fig. 23.)

Ceylonia magnifica, Lichtwardt, Deut. Ent. Zeits. p. 646, ♂ (1909).
Atriadops nivea, Brunetti, Rec. Ind. Mus. vii, p. 477, ♂ (1912).

♂ *Head* blackish grey; palpi thin, small, of same colour; eyes brown, very large, contiguous for half the distance from the very small vertex (bearing three small ocelli) to base of antennæ, the first two joints of which are brown (3rd joint missing); underside of head with some grey hairs. *Thorax* thickly clothed with pale yellowish-grey hairs, which become white on the sides. *Abdomen* thickly clothed with pale yellowish-white hairs, which, seen in front, appear silvery white; venter dark grey, with grey hairs. *Legs* dark reddish brown. *Wings* clear, narrowly dark brown at base; also a narrow, irregular but clearly-cut stripe across the middle from the costa nearly to the hind border; a second wider similar band towards tip, which reaches the hind margin, spreading over both sides of the "diagonal" vein, and connected along the costa with a small apical spot, and proximally less distinctly with the median band, leaving a well-marked clear oblong spot between the 1st and 2nd longitudinal veins; a small brown spot on wing-margin at tip of 5th longitudinal vein and a larger one at tip of 6th.

Length, 12 mm.

The species was described originally by Lichtwardt from a single ♂ from Pundaluoya, Ceylon (*Green*), in the British Museum. At the time of describing my *nivea* I had overlooked this author's paper on Oriental NEMESTRINIDÆ, and the description given here is that of the type of my species from a single ♂ in my collection from Haldumulla, Ceylon (*Green*).

Family CYRTIDÆ.

Head very small, subglobular, almost wholly consisting of the enormous eyes, which are contiguous in both sexes; vertex very small; frons generally very small. Proboscis varying from very thin and elongate (as in some BOMBYLIIDÆ) to very short or obsolete; palpi generally obsolete. Antennæ approximate at base, placed in some genera well above, in others well below the middle line of the head, 3-jointed, variable in shape, 1st joint sometimes minute.

Thorax greatly humped; prothorax sometimes (PHILOPOTINÆ, non-Oriental) enormously developed; pubescence moderately thick, sometimes furry; scutellum large, without bristles; metanotum generally concealed by it.

Abdomen very broad and gibbous, often quite globular and pellucid, normally 5-segmented; pubescence variable; genitalia inconspicuous.

Legs simple, comparatively short, rarely with a short blunt spur on middle tibiæ, or with one developed and one less developed spur on posterior tibiæ, or a circlet of very short spines on front tibiæ: 3 pulvilli; empodium as pad-like as outer pulvilli; claws long. The entire body is wholly devoid of spines or strong bristles.

Wings diverging and deflexed when at rest, longer in ♀ than in ♂; venation very characteristic, but a general interpretation of its varied forms would be out of place here, as only four genera are Oriental. Ambient vein at times quite absent, even above the wing-tip; auxiliary and 1st veins long, 2nd vein often absent; præfurca beginning about opposite the base of the discal cell; anterior cross-vein near base of discal cell, sometimes very short or absent; 3rd longitudinal vein generally forked; posterior cross-vein present or absent, 4th vein with manifold ramifications; 5th vein generally forked; anal vein present, sometimes weak and, with the axillary vein, possibly absent. Technically two submarginal cells and from three (sometimes *apparently* only two, owing to the dividing vein being obsolete) to five posterior cells. The venation in this family is, perhaps, not thoroughly understood yet.* Thoracic squamæ enormously developed and very prominent, wrinkled, and generally pubescent, their size being one of the chief characters of the family.

Life-history. The metamorphoses of several species are known†, the larvæ being parasitic in the egg-cocoons or the abdomens of spiders. The larva is amphineustic (though König describes that of *Oncodes* as metapneustic), short, thick, 12-segmented, with very

* See Verrall, Brit. Flies, v, p. 447 *et seq.*

† *Astomella lindenii*, Erichs., Brauer, Verh. zool.-bot. Ges. Wien, xix, p. 737, pl. xiii, figs. 1–6 (1869), and in Denks. Ak. Wiss. Wien, xlvii, pl. v, figs. 89–92 (1883). *Oncodes pallipes*, Latr., Menge, Schrift. Danzig. Natur. Ges. i, p. 37 (1866); *Oncodes fumatus*, Erichs., Brauer, Verh. zool.-bot. Ges. Wien, xix, p. 737 (1869). *Henops brunneus*, Hutton, Maskell, Trans. Proc. N. Zeal. Inst. xx, p. 106, pl. x (1888).

small head and small mouth-parts; the posterior spiracles accompanied by peculiar large plates. Pupa free, with a median longitudinal row of spines on dorsum of thorax. Lundbeck writes of one species:—"The larva was lying in the abdomen of a *Cteniza ariana* with the terminal spiracles in one of the lungs of the *Cteniza*. Before pupation the larva left the now dead Arachnid and transformed in the nest." Stein and König state that the eggs of some species are deposited on branches of trees, also that the young larvæ possess considerable leaping powers.

The globular shape of the CYRTIDÆ with the very large squamæ and characteristic venation stamp the members of this family with a facies peculiarly their own, except for a few short, hump-backed BOMBYLIIDÆ, but from these the three (not two) pulvilli and the venation at once separate them.

This family is by some authors called the ACROCERIDÆ, but the name is "absolutely contradictory to most of the genera" (Verrall). The term CYRTIDÆ was used as far back as 1841, the genus *Cyrtus* antedates *Acrocera*, and the family name is supported by Verrall, Osten-Sacken, and others.*

The range of the family is world-wide, but only about two hundred species are known.

Table of Subfamilies.

Prothoracic plates enormously developed, united dorsally, forming a large shield between mesonotum and neck.	PHILOPOTINÆ, p. 158.
Prothoracic plates not conspicuously developed.	
Third antennal joint long and strap-shaped; no trace of style or apical bristle	PANOPINÆ, p. 160.
Third antennal joint generally short; apical bristle or stiff hairs always present	CYRTINÆ, p. 163.

There are different views as to the location of some of the genera, as to their synonymy and their limits. I follow Verrall in keeping *Pterodontia* in CYRTINÆ.

Subfamily PHILOPOTINÆ.

The principal character is the enormous development of the prothoracic plates. Only one species is Oriental.

Genus **PHILOPOTA**, *Wied.*

Philopota, Wiedemann, Ausser. Zweifl. ii, p. 17 (1830).

GENOTYPE, *Philopota conica*, Wied. (Brazil).

Head much puffed out behind eyes; three ocelli †; eyes con-

* The family has been called by various other names by different authors; INFLATÆ, for instance, and ONCODIDÆ, Kertész even retaining this latter name to the present day.

† According to Wiedemann; the lower ocellus in my species is not discernible, but it is impossible to state definitely that it is not present.

tiguous, pubescent; frons slightly prominent on lower part; antennæ elongate, porrect, approximate and bulbiform at base, situated immediately above base of proboscis, 3rd joint with apical bristle. Proboscis very long and thin, projected below the body to a considerable distance. *Thorax* with prothoracic lobes enormously developed, prominent, their inner angles touching one another. *Abdomen* conical (*conica*, Wied., type) or rounded (*viridænea*). *Legs* of moderate length and size, of the normal Cyrtid type. *Wings* with auxiliary and 1st longitudinal veins long, nearly parallel, præfurca beginning just before middle of wing; 2nd longitudinal vein long, ending much above wing-tip; 3rd vein simple, dying away a long distance from border of wing; anterior cross-vein present; 4th vein simple, nearly straight, almost attaining border; 5th vein simple, twice bent towards tip; anal vein long, reaching wing-border.*

Range. South Europe, Asia Minor, India, Japan, Mexico, and South America.

The above is an attempt at an augmented description of the genus, as Wiedemann's was so short.† When additional species are known a further description may be given.

123. **Philopota viridænea**, sp. nov.

Head much extended behind the eyes, the surface shining æneous green, closely punctured, covered with rather dense, moderately short, yellow pubescence; eyes touching from just below the small vertex bearing the ocelli,‡ and with moderately short, not dense, dark brown pubescence, facets of uniform size; frons of moderate size, flush with eyes at apex, but rather prominent on lower part, dark shining blackish brown, more or less yellow on lower margin; antennæ elongate oval, dark shining brown, with long, yellow, translucent style; cheeks blackish grey; the large, smooth, oval, shining black base of the proboscis beginning just below the antennæ; the rest of the proboscis bright yellow, bare, in length reaching under the body to tip of abdomen, the tip widely bifid. *Thorax* with the entire surface of dorsum and sides, and of scutellum, shining æneous green, closely punctured, covered with very short yellow pubescence. Prothoracic lobes very large and prominent, subtriangular, their inner angles contiguous, the upper angles tipped with yellow. *Abdomen* æneous green, closely punctured, with very short yellow pubescence, which on the last two segments and towards sides of previous segment is changed to greyish; extreme side-margins of most of the segments

* Verrall suggests a different reading of the veins, calling them in order, auxiliary, 1st and 3rd longitudinals, and 4th vein (forked, the anterior cross-vein being therefore absent).

† "Antennæ porrect, approximate, small, inserted above base of proboscis, bulbiform, bristles apical. Proboscis elongate, deflexed before thorax. Eyes contiguous, hairy. Three ocelli. Abdomen conical."

‡ Only the two upper ones are obvious; there should be three.

narrowly brownish yellow; venter dull æneous, with short whitish pubescence; genitalia concealed, somewhat yellowish. *Legs* blackish with short grey pubescence; femora black, extreme base and nearly the apical half yellow; rest of legs wholly yellow; all legs with very short inconspicuous pale pubescence; the three yellow pulvilli and the black claws distinct. *Wings* yellowish grey, considerably iridescent and rippled; veins in anterior part of wing black and distinct, the remainder yellowish and less distinct. Thoracic squamæ enormous, grey, with short greyish pubescence on disc and edge, sufficiently transparent for the brownish-yellow halteres concealed below them to be seen.

Described from a perfect unique from Dungagali, 8000 ft., Hazara District, 21–22. v. 1915 (*T. B. Fletcher*).

Type sent to British Museum.

Subfamily PANOPINÆ.

Little can be added to the characters given in the table. The basal and discal cells are generally well defined.

Genus **PIALEA**, *Erichs.*

Pialea, Erichson, Entomographica, i, p. 160 (1840).

GENOTYPE, *Pialea lomata*, Erichs.; by original designation.

Body of the normal Cyrtid type. Head very small, mostly occupied by the densely pubescent, contiguous eyes; occiput flattened, three ocelli; proboscis very short, no obvious palpi. Antennæ deflected, placed on the underside of a distinct tubercle in the middle of face between the eyes; 1st and 2nd joints short, bristly, 3rd very large, elongate, leaf-shaped with obtuse tip, much longer than two basal joints together. Thoracic squamæ enormously developed. Abdomen thick, oblong, conical, longer than thorax, densely pubescent, 6-segmented. Legs of normal Cyrtid type, tibiæ ending in a small blunt tooth-like projection on inner side. Wings of moderate size, slightly elongate; costa ending at tip of lower branch of 3rd vein, immediately before wing-tip; auxiliary vein ends at from two-thirds of wing (*auripila*) to nearly end of wing (*lutescens*); 1st longitudinal vein very long; 2nd begins at one-fourth of the wing, straight or gently curved towards tip, ending just beyond 1st; 3rd begins very near origin of 2nd, widely forked towards tip, nearly straight, with lower branch ending below wing-tip (*lutescens*), or bent upwards, both branches ending before wing-tip (*auripila*); anterior cross-vein very near origin of 3rd vein, at basal end of the elongate discal cell; 4th vein with apparently both branches forked, upper prong of upper branch closing the 1st posterior cell and giving the appearance of another discal cell in front of and parallel with the true one. In *lutescens* upper prong of lower branch throwing off a veinlet

closing discal cell (or it may be regarded as a discal cross-vein); in *auripila*, if such veinlet is a discal cross-vein, the 4th vein's lower branch is not forked, joining upper branch of 5th a little before margin of wing. Posterior cross-vein short; 5th vein forked, lower branch closing anal cell; axillary vein present (at least in *auripila*). Three submarginal cells; three or four posterior cells (first and last closed).*

Range. The only other known species (*P. lomata*) is from Brazil.

Life-history unknown.

124. **Pialea auripila,** *Brun.* (Pl. II, figs. 24, 25.)

Pialea auripila, Brunetti, Rec. Ind. Mus. vii, p. 472 (1912).

♂ *Head* about half the full height of the thorax; eyes closely touching from the extremely small vertex to the base of the antennæ, rather densely covered with long brownish-yellow hair; vertical triangle with three ocelli, slightly elevated; occiput much flattened, with brownish-yellow hairs; proboscis very short, subconical, blackish, with some yellow hairs at tip; palpi not obvious; frontal triangle black, very small, projecting over basal joints of antennæ, which are short, a little broader at tip, blackish, with black bristles; the third joint of the shape of an elongated leaf, flattened, with obtuse tips, three times as long as the two basal joints together, yellowish, with dark brown lower margins. *Thorax* high, robust, nearly quadrate; ground-colour dark shining brown, closely covered with rather long thick bright golden-yellow hair. Scutellum and metanotum concolorous in ground-colour and hair with the dorsum; sides of thorax dull yellowish, with long thick golden-yellow hair; a little brownish hair is intermixed here and there with the yellow hair of the thorax. *Abdomen* robust, thickened, longer than thorax, oblongo-conical, tip pointed. Brownish yellow; 1st segment very short; the dorsum of each segment mainly occupied by a large semi-circular dark brown spot at base, and extending in the middle of the segment to the hind margin, leaving the sides of the segments mainly yellow; 5th and 6th segments all black, the latter very small. Venter blackish brown, practically bare, emargination of segments narrowly yellow. The whole upper side of the abdomen with bright golden-yellow hair, which is brownish towards the tip. *Legs* with coxæ half as long as femora, yellowish, with pale yellow hairs. Tibiæ (which are a little longer than the femora) and tarsi black, with blackish-brown hairs; underside of tibiæ brownish yellow, and emarginations of the tarsal joints below narrowly yellowish; tibiæ a little broadened at tips, where they end in a small blunt tooth-like projection on the outer side. Tarsi a little longer than tibiæ, base of metatarsus (which is equal in length to

* My reading of the venation in my description of *P. auripila* was slightly faulty, the present interpretation being more probably correct.

the rest of the tarsus) pale yellow. *Wings* barely as long as abdomen, rather broad, tip rounded, pale grey; costal vein very distinct, ending at tip of lower branch of 3rd vein, immediately before the extreme tip of the wing; auxiliary (subcostal) and 1st longitudinal veins thick, the former ending at about two-thirds of the wing, the latter a little beyond it, both nearly straight, distinctly separate (though approximate) from just beyond the humeral cross-vein; the 2nd and 3rd longitudinals with the anterior cross-vein have the appearance of springing from a common stem (or else the 3rd longitudinal and the anterior cross-vein spring simultaneously from the 2nd vein at a little beyond its base); 2nd vein nearly straight, but curved upward at its tip, to the costa; 3rd vein nearly straight, and in a straight line with the præfurca, forking widely towards its tip, and becoming suddenly much thinner, both branches ending in the costa distinctly before the wing-tip; anterior cross-vein short, near base of discal cell; 4th longitudinal vein forking just before anterior cross-vein; upper branch nearly straight for more than half its length, thence with a slight curve, forked, the upper

Fig. 10.—*Pialea auripila*, Brun., antenna.

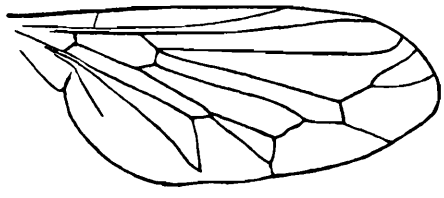

Fig. 11.—*Pialea auripila*, Brun., wing.

prong erect, closing 1st posterior cell, lower prong running to wing-margin; lower branch of 4th vein also comparatively straight, forked so widely towards its tip that the prongs are nearly in the same straight line with one another, upper one closing discal cell, lower one joining upper branch of 5th vein towards its tip, closing 3rd posterior cell. Posterior cross-vein very short, placed at about middle of discal cell; 5th vein thickened, forked near its junction with posterior cross-vein; lower branch closing anal cell. First basal cell rather large and broad, bounded distally by the anterior cross-vein; 2nd basal cell much longer and narrower, bounded distally by the posterior cross-vein; discal cell elongate, about $3\frac{1}{2}$ times as long as its greatest breadth. The 1st submarginal cell nearly as long as the marginal and narrowed at wing-margin; 2nd submarginal cell small, subtriangular. The 1st posterior cell embraces the wing-tip, but the upper prong of the upper branch of the 4th vein divides the cell at two-thirds of its length; 2nd posterior cell large, of irregular shape; 3rd closed, much wider distally; 4th subtriangular, formed by the branches of the 5th vein; anal vein slightly curved; axillary vein short, axillary cell large. Alulæ

very small; squamæ pale yellowish, the upper ones small, the lower ones very large and pubescent. Halteres yellowish.

Length, 12 mm.

Described from a single perfect ♂ in the Indian Museum from Kurseong, 6000 ft., 26. viii. 1909 (*D'Abreu*).

This species is undoubtedly a *Pialea*, though it offers a slight variation from the venation of the type species,* and the shape of the abdomen is different. In my remark after my original description of *auripila* about Westwood's figure of the antennæ, I overlooked his statement in his description of the tubercle on the face and the fact that the antennæ are placed on the underside of it. This fact further convinces me that my species is correctly placed in *Pialea*.

Subfamily CYRTINÆ.

Prothorax not forming a dorsal shield in front of mesonotum. Third antennal joint normally short, with apical arista or hair-like rays.

Three genera are Oriental, and are easily distinguished as follows:—

An additional cell in wing above the discal and about as long	LASIA, Wd., p. 163.
No such cell.	
Costa with an angular projection at tip of 1st longitudinal vein; antennal tip with three stiff hairs, or a style bearing three such hairs.	PTERODONTIA, Gray, [p. 165.
Costa without such projection; antennæ ending in a long arista	ONCODES, Latr., [p. 168.

Genus **LASIA**, *Wied.*†

Lasia, Wiedemann, Analec. Entom. p. 11 (1824); id., Ausser. Zweifl. i, p. 329 (1828).
Mesophysa, Macquart, Dipt. Exot. i, pt. 2, p. 166 (1838).
Vertexistemma, Bigot, Ann. Soc. Ent. France, (3) iv, p. 65 (1856).
Verticistemma, Bigot, *op. cit.* vii, p. 200 (1859).

GENOTYPE, *Lasia splendens*, Wied. (Brazil).

Body of the usual Cyrtid type. *Head* with eyes bare, contiguous in both sexes, facets very small, of uniform size; no ocelli; proboscis from a little shorter to a little longer than the body, narrow, cylindrical; palpi apparently absent or obsolete. Antennæ 3-jointed, porrect, approximate at base, diverging; 1st joint cylindrical, short; 2nd broader than 1st, wider towards the

* *P. lomata*, Erichs. (as *P. lutescens*, Westw., sp. nov.) Trans. Ent. Soc. Lond. (1876) pl. vi. This is the only other known species, and is from Brazil.

† Kertész in his catalogue ranks *Lasia* as synonymous with *Panops*, Lam. (Ann. Mus. d'Hist. Nat. iii, p. 263, 1804). Nearly all the species have been described under *Lasia*, and, as Verrall accepts it without comment, I follow him. It is a moot point if *Lasia* should belong to the PANOPINÆ or CYRTINÆ.

bluntly truncate tip; 3rd elongate lance-shaped, bare, shining, produced into a long style, which is longer than the entire antenna. *Thorax* and *abdomen* densely pubescent. *Legs* of moderate length, simple. *Wings* with auxiliary vein ending about middle of costa; 1st longitudinal ending towards wing-tip, nearly straight; 2nd starting soon after humeral cross-vein, nearly parallel with 1st, both slightly upturned at tips; 3rd beginning immediately beyond base of 2nd, descending in a straight line diagonally across the wing, forking abruptly beyond its middle, the two branches curving upwards, practically parallel, ending above wing-tip; 2nd submarginal cell truncate at base; anterior cross-vein just beyond origin of 3rd vein, very near base of discal cell, short; upper branch of 4th longitudinal vein forked at tip of discal cell, at which point a short transverse vein connects with the forking of the 3rd vein; lower branch of 4th vein simple, suddenly recurrent towards tip, ending jointly with upper branch of 5th vein at about middle of hind border of wing; discal cross-vein long, closing discal cell; 5th vein forked at half its length; upper branch meeting 4th vein at middle of discal cell; lower branch closing anal cell well before margin; posterior cross-vein absent, axillary vein foreshortened. Two submarginal cells; five posterior cells, 1st divided by a transverse vein,* 4th closed. Squamæ very large.

Range. Europe, India, Australia, North and South America.

Life-history apparently unknown.

The present description is built up mainly on *L. aurata*, as the genus does not appear to have been diagnosed since Wiedemann founded it. Some of the characters herein given may require modification, as no other species is available for comparison.

125. **Lasia aurata**, sp. nov.

Head with vertical triangle black, roughened, elevated, with long chrome-yellow, rather drooping, bristly hairs; eyes black, facets very small, of uniform size, with no trace of any transverse channels across the discs; frontal triangle elevated, black, shining, bare. Antennal 1st and 2nd joints bright yellow, short; 2nd

* In his notes on the genus *Lasia* (Brit. Flies, v, p. 450) Verrall distinctly states that the extra cell "is a second portion of the upper basal cell and *not* a basal part of the 1st posterior cell," and he compares the venation with that of the NEMESTRINIDÆ, but I venture to think that the anterior cross-vein (also recognised by Verrall as such) cannot be placed *in* the basal cell, but must, when present, invariably divide the 1st basal from the 1st posterior cell. It seems to me that the short cross-vein connecting the 3rd and 4th veins in *Lasia* and one or two other genera in this family (*Eulonchus*, *Pteropexus*, etc.), represents the point at which in the NEMESTRINIDÆ the 3rd and 4th veins anastomose, which in that family occurs in contact with the discal cell and not distinctly beyond it as in CYRTIDÆ. Even if in NEMESTRINIDÆ this usually punctiform contact is replaced by a short cross-vein, it should be regarded as identical with the same extra cross-vein in CYRTIDÆ and not as the anterior cross-vein, which would, therefore, be wholly absent in NEMESTRINIDÆ.

subcylindrical, narrower at base, tip almost rounded; 3rd shining chestnut-brown, base yellowish, lance-shaped, the tip drawn out into a long concolorous style, which is about as long as the whole antenna; 2nd joint with yellow hairs. Face, except immediately below antennæ, deeply sunken between the eyes, shining black, bare, narrower on upper part; occiput grey, covered along the margin apparently with long bristly bright yellow scale-like pubescence.* *Thorax* moderately shining black on disc, with apparently a slight æneous tinge, the dark colour extending forward in a broad band to anterior margin; rest of dorsum bright yellow, including shoulders, humeri, and mesopleuræ; ground-colour of scutellum brownish yellow, that of remainder of the pleuræ grey or yellowish grey; whole thoracic dorsum, scutellum, and pleuræ covered with dense long bright yellow bristly scale-like pubescence, which becomes a little paler over shoulders and lower part of sides of thorax, and more orange over scutellum and on hinder part of thoracic dorsum. *Abdomen* yellowish brown, lighter on 1st segment and deeper on 3rd and 4th; all segments with a well-defined lemon-yellow hind border of moderate width, broadest and least well-defined on 1st and 5th segments, on which latter it occupies more than half the surface. Whole dorsal surface covered with moderately short light brown pubescence, and towards tip some microscopic pale yellow depressed hairs. Venter mainly yellowish, with a blackish median band on hinder part and some transverse black marks on 3rd and 4th and following segments; genitalia inconspicuous, hidden. *Legs* wholly lemon-yellow with short soft concolorous pubescence. *Wings* practically clear to base, distinctly ribbed; veins brown; thoracic squamæ pale yellow, with long bright yellow fringe.

Described from a single specimen in the British Museum, labelled simply "Ind."

Genus **PTERODONTIA**, *Gray*.

Pterodontia, Gray in Griffith's Anim. Kingd. xv, p. 779 (1832).
Pteredontia, Macquart, Hist. Nat. Dipt. ii, p. 514 (1835).

GENOTYPE, *Pterodontia flavipes*, Gray; by original designation.

Body of the normal Cyrtid type, pubescent. *Head* extremely small, nearly wholly occupied by the eyes, which are very large, contiguous in both sexes, densely pubescent; three ocelli; mouth-opening more or less concealed; proboscis short. Antennæ situated at bottom of head, 3-jointed; 1st cylindrical, 2nd short, 3rd conical, with (according to Macquart) a long bare style, but in *P. dorsalis* with three very long fine stiff hairs.† Thoracic lobes developed; thoracic squamæ enormously so. *Abdomen*

* The head is so closely affixed to the thorax that it is difficult to state whether the adjacent pubescence belongs to the thorax or the occiput.

† These might easily cling together, giving the appearance of a long bare style.

short, rounded, very thick, 6-segmented. *Legs* of normal Cyrtid type; tibiæ ending in a well-developed blunt spine on front side, with a smaller less developed one on inner side. Three pulvilli greatly developed; claws long and strong. *Wings* with a very conspicuous angular projection in the costa at tip of 1st longitudinal vein, at about three-fourths the length of the wing, the costa being considerably thickened at the spot; auxiliary vein ending in costa at about middle of wing; 2nd vein beginning just before middle of wing, curving upwards towards its tip and ending only just beyond tip of 1st vein; 3rd vein beginning soon after origin of 2nd, simple, forming a decided upward curve and ending much before the wing-tip, at which spot the costa ends; anterior cross-vein absent; forking of 4th vein enclosing a discal cell, closed distally by the discal cross-vein; posterior cross-vein absent; 5th vein forked, the upper branch forming lower side of discal cell; anal cell closed; axillary vein absent. One submarginal and two posterior cells, the 1st exceedingly large, embracing wing-tip.

Range. Europe, N. and Cent. America, Brazil, Somaliland, Australasia.

Life-history unknown.

Macquart gives a figure of a wing and head of *Pterodontia** in his Hist. Nat. Dipt. (pl. xxi, figs. 5 *b* and 5 *a*, respectively), but while the wing is of this genus, though very incorrectly drawn, the head is that of an acalyptrate Muscid, and he acknowleges this error later (Dipt. Exot. ii, p. 1), where he gives (pl. i, fig. 2) a correct wing, and states that the acalyptrate previously figured is *Trigonosoma perilampiformis.*

126. Pterodontia kashmirensis, *Licht.*

Pterodontia kashmirensis, Lichtwardt, Deut. Ent. Zeits. p. 124 (1909).

The two species described here are evidently very closely allied, if not identical. Their only distinctions appear to be as follows:—

Sides of thorax clay-yellow, with a round black spot; coxæ all pale.	*kashmirensis,* Licht.
Sides of thorax black, except mesopleura, which is brownish yellow with a square black spot; coxæ blackish ..	*dorsolineata,* Brun.

♂ "Distinct by the globular body, the low-placed head, and the remarkably shaped wing; a conspicuous clay-yellow species with black markings. From the head hindward runs a narrow black stripe up to about one-third of the thorax, where it widens into an oval spot which reaches to the scutellum; sides of thorax clay-yellow, with a distinct round black spot directly in front of the wing-base; scutellum bearing an elongate transverse middle

* *P. macquarti,* Westw. (*flavipes,* Macq., *nec* Gray).

spot, leaving a pale margin all round of uniform width; underside of thorax shining black. *Abdomen* with 1st segment wholly black; 2nd broadly black in the middle, so that about one-fourth of the segment on each side remains pale; 3rd and 4th segments each with a blackish triangular mark, with rounded angles and with the apex directed backwards, both segments bearing also a black rounded spot towards the anterior angles; 5th segment wholly black, except for a narrow yellow hind border with a tooth-like extension in the middle; 6th segment similar, with rather stout genital organs. The yellow antennæ, which are placed so low that they touch the front coxæ, consist, so far as can be seen, of a cylindrical joint and a globular one, half as large as the 1st; on the latter is a yellow bristle, which at a magnification of 27 (Zeiss) is seen to be composed of two hairs separated at the base. The distinct ocelli are placed on the occipital margin almost directly over the antennæ; eyes very hairy. Whole body with short pale pubescence, with which some darker hairs are intermixed only on the blackish markings and on the middle coxæ. *Legs* wholly pale ivory-yellow, with large yellow empodia, the claws wide apart, black on the apical half. *Wings* hyaline, with yellow veins, the costal projection rather pointed.

"The species is distinct from *Pt. waxelii*, Klug, with the type of which in the Berlin Museum I have compared it, and from *flavipes*, Macq., by the entirely pale coxæ and femora." (*Lichtwardt.*)

Length, 8 mm.; wings, 8 mm.

Kulu, Kashmir, 5000 ft.

Type (presumably) in Lichtwardt's collection.

127. **Pterodontia dorsolineata**, *Brun.* (Pl. II, figs. 26, 27.)

Pterodontia dorsolineata, Brunetti, Rec. Ind. Mus. vii, p. 475, pl. xxxvii, figs. 8, 9, 10 (1912).

♀ *Head* with eyes very large, black, closely contiguous, rather thickly pubescent; occiput moderately puffed out, dark grey; vertex small, three dull red ocelli. Antennæ yellowish, the three joints nearly equal in length, but the 3rd rather the longest, with three very long straight bristly hairs at tip. Proboscis distinct, but short, cylindrical, pale yellow. *Thorax* brownish yellow, the dorsum mainly occupied by a large black shining spot, which is continued forward as a stripe as far as the anterior margin; sides of thorax black, except the mesopleura, which is brownish yellow, with a square black spot in the middle. The whole thorax covered with brown or yellowish hair, concolorous with the colour of the surface. Scutellum brownish yellow, pubescent, with a large basal, nearly circular, black spot. *Abdomen* brownish yellow; 1st segment all black; 2nd all black, except towards the sides; 3rd, 4th, and 5th with a black spot on each segment, widest in front, extending from fore to hind margin, except on the 5th segment, where the spot fails to reach the latter; these spots

form, with the black colour of the 2nd segment, a conspicuous, clear-cut, dorsal band of irregular width; 6th segment wholly black; on each of the 2nd, 3rd, 4th, and 5th segments is a subquadrate black spot placed contiguous to the anterior and lateral margins. Venter yellowish, the segments faintly emarginate with brown, unmarked. The whole abdomen bears brown or yellow pubescence, concolorous with the colour of the surface. *Legs* wholly yellowish, except the blackish coxæ. The middle femora and tibiæ are distinctly longer than the fore pair, and the hind pair are proportionately longer than the middle pair. Tarsi long; the anterior ones about equal in length, but the hind pair are distinctly longer, proportionately. The tibiæ end in a well-developed (almost *Bibio*-like) blunt spine on the front side, with a smaller one (easily seen on the hind legs only) on the inner side. The pulvilli, three in number, elongate, very greatly developed;

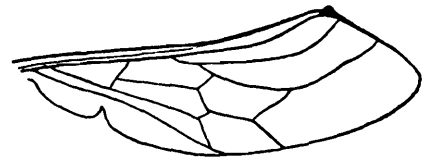

Fig. 12.—*Pterodontia dorsolineata*, Brun., wing.

the claws very long and strong, curved. *Wings* colourless, veins yellow, venation normal; upper squamæ quite small, nearly circular, lower pair very large, with a short yellow fringe, both practically colourless; halteres black.

Length, 7 mm.

Described from a single specimen in the Indian Museum from Maymyo, 3800 ft., near Mandalay, Upper Burma, v. 1910 (*H. L. Andrewes*).

This species must be very near and possibly identical with *kashmirensis*, Licht.

Genus **ONCODES**, *Latr.*

Oncodes, Latreille, Précis Caract. Gen. Ins. p. 154 (1796).
Henops, Meigen, Illig. Mag. ii, p. 226 (1803).

GENOTYPE, *Musca gibbosa*, L.; by original designation.

Head nearly all eyes, which are larger in ♂ than ♀, bare; vertex very small; two ocelli; frons slightly produced; proboscis and palpi apparently absent, the aperture closed by a membrane. Antennæ placed at extreme lower part of head, 2-jointed; 1st joint short, thick, cylindrical; 2nd oval, ending in a long thin arista-like style, dilated at base, and with a hair-like bristle at tip. *Thorax* spherical; humeral, prealar, and postalar calli large, but not very conspicuous; pubescence moderately dense; scutellum large, with very deep rounded margin, leaving only a small disc; metanotum rather small. Thoracic squamæ enormous, with

dense pubescence; alar squamæ with soft down; halteres short. *Abdomen* dorsally arched, lower side more or less flat, 5-segmented; short ovate in ♂, short and round in ♀; pubescence moderate; genitalia concealed. *Legs* rather short and stout, simple, no spurs, tarsi with 1st and 5th joints longer than the others; pulvilli and claws distinct. *Wings* in ♂ short, in ♀ larger and longer, venation imperfect, the veins failing to reach the margin; 2nd longitudinal vein absent, 3rd nearly straight, unforked, projected in a direction much below wing-tip; anterior cross-vein apparently present, though weak; 4th vein forked, lower branch again forked; 5th vein forked widely, the upper branch sharply angled, at which point it seems anastomosed with the lowest branch of the 4th vein, so it is difficult to say if the posterior cross-vein is present or not;* anal and axillary veins present, weak. Two basal cells, fairly distinct; no discal cell; posterior cells merged in the open hind part of wing; anal cell open owing to the foreshortened anal vein.

Range. Europe, N. America, N. Africa, Asia, Australasia.

Life-history of two or more European species more or less known.†

Table of Species.

1. Abdomen without bands . ..	*fuscus*, Brun., p. 171.
Abdomen with pale transverse bands	2.
2. Conspicuous pale spots on abdomen	*octomaculatus*, Brun., [p. 170.
Without abdominal spots	3.
3. Posterior corners of thorax and hind margin of scutellum distinctly pale	*rufomarginatus*, sp. n., [p. 171.
These parts not pale	4.
4. Thorax unmarked; wings brownish yellow; basal half of tibiæ tawny; length 5 mm..	*angustimarginatus*, [sp. n., p. 171.
Thorax with two tawny stripes; wings clear; legs black, except coxæ below and knees; length 3 mm.	*costalis*, Walk., p. 169.

128. **Oncodes costalis**, *Walk.*

Henops costalis, Walker, Ins. Saund., Dipt. pt. 3, p. 203 (1852).

"Head black; feelers tawny; chest and breast pitchy, clothed with pale tawny hairs; chest adorned with a tawny border and two tawny stripes; abdomen pitchy; hind borders of the segments whitish; legs pitchy; hips beneath, knees, and fore feet tawny; wings colourless, wing-ribs and veins dark tawny; veins partly pitchy along the fore border; scales pale grey, with tawny borders. Length of the body $1\frac{1}{2}$ lines, of the wings, 3 lines. East Indies." (*Walker.*)

A specimen is in the British Museum, labelled simply "Ind.," and I am informed that it probably came from India proper.

* Verrall says it is absent.
† See p. 157.

129. **Oncodes octomaculatus**, *Brun.* (Pl. II, figs. 28, 29.)

Oncodes octomaculatus, Brunetti, Rec. Ind. Mus. vii, p. 476 (1912).

♂. *Head* with eyes very dark reddish brown, bare; vertex and back of head blackish; two ocelli present. Antennæ normal (apparently, as they are not properly visible), terminated by a long arista, which is slightly thickened at the base, and is thinnest in the middle, the tip provided with two minute stiff hairs. *Thorax* brownish yellow, with three dorsal clear-cut black stripes of moderate and equal width, the median one attaining the anterior margin, the outer ones considerably foreshortened; hinder part of dorsum all blackish, the colour extending to the scutellum; the metanotum brownish yellow; a short black streak (which in one specimen forms nearly a complete circle) on each side in front, below each shoulder, sometimes joined to the tips of the outer dorsal stripe; a small blackish mark at base of wing, and the underside of the thorax mainly blackish. Thorax with a little light yellow pubescence generally distributed both on dorsum and sides. *Abdomen* mainly blackish, with light yellowish pubescence;

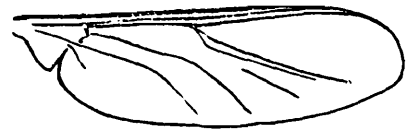

Fig. 13.—*Oncodes octomaculatus*, Brun., wing.

hind margins of segments narrowly pale yellowish white, the colour widest on 5th segment; 2nd segment with two large oval greyish-white spots nearly filling the dorsum, but quite clear of the borders in all directions; 3rd and 4th segments each with a pair of moderate-sized brownish-yellow spots, one on each side of the middle; 5th segment with an elongated similarly coloured spot, clear of the borders in all directions, and nearly filling the segment; 6th segment much smaller, practically a replica of the 5th; lateral margins of each segment occupied by a shining black elongate spot, which does not overlap the pale hind margin. Venter pale yellowish; sometimes (in one example) a black spot towards the lateral margins as on dorsal surface. *Legs* brownish yellow; hind pair with coxæ more or less at base, femora at base and a broad subapical band, and tibiæ and tarsi almost wholly, brown or blackish. *Wings* yellowish grey; venation normal; squamæ dirty grey, shortly and closely pubescent, and of the normal enormous size.

Length, 4 mm.

Described from two ♂♂ in the Indian Museum, from Igatpuri, Western Ghats, Bombay Presidency, 20. xi. 1909 (*Annandale*); Nasik, Bombay Pres., iii. 1911.

130. **Oncodes fuscus**, *Brun.*

Oncodes fuscus, Brunetti, Rec. Ind. Mus. vii, p. 477 (1912).

? ♀ *Head* wholly blackish; eyes closely contiguous; vertex a little prominent; two ocelli; some black hairs on the rather puffed-out occiput. Arista pale yellowish, nearly transparent, shaped as in *O. octomaculatus*, Brun. *Thorax* wholly dark shining brown, with greyish-brown pubescence. *Abdomen* dark nut-brown, with greyish-brown pubescence; the sides and venter a little darker; hind margins of segments with a trace of a narrow black border. *Legs* uniformly brownish yellow; coxæ darker brown. *Wings* colourless, the stronger veins brownish yellow.

Length, 3 mm.

Described from a single specimen in the Indian Museum from Sahelwa, Bahraich District, United Provinces, India, 2. iii. 1909.

From the relatively smaller size of the head and the more puffed-out occiput I infer that the present specimen is a ♀

In the Pusa collection is an *Oncodes* representing a new species allied to *fuscus* from Bengal, but the abdomen is missing.

131. **Oncodes angustimarginatus**, sp. nov.

Head with frons and antennæ brownish yellow; eyes and vertex black; occiput blackish, with a row of bristly black hairs towards the margin. *Thorax* moderately shining black, covered with moderately short, rather dense, brownish-yellow pubescence; scutellum similar. *Abdomen* moderately shining black, with minute black pubescence; hind margins of all segments clearly defined, narrowly cream-yellowish; venter mainly yellow, basal part black. *Legs* shining black, minutely pubescent; basal half of all tibiæ brownish yellow, the colour rather more extended on inner side; tarsi dark brownish black, more than the basal half of metatarsi brownish yellow, claws black. *Wings* distinctly brownish yellow, veins very dark brown; thoracic squamæ shining black, with minute yellow pubescence; halteres yellow, knobs black.

Length, 5 mm.

Described from a single specimen in the British Museum from Pirivipancheram, Ceylon, 21. i. 1892 (*Col. Yerbury*). A note adds:—"Only example seen; at top of hill, found near form of a sambur." A second specimen from Pusa, 6. xii. 1911, with the thorax all black.

132. **Oncodes rufomarginatus**, sp. nov.

Head with eyes black; the triangular frons blackish, with microscopic grey pubescence; extreme margin white-dusted. Antennæ with 1st and 2nd joints black, with microscopic grey pubescence; 3rd of normal shape, basal swollen part shining brownish black, remainder brownish yellow. *Thorax* moderately shining black; dorsum wholly covered with fairly dense, pale

yellowish-grey pubescence, which extends over the upper pleuræ and the scutellum; the large posterior calli reddish brown, as is the posterior margin of the scutellum wholly (type) or in part (cotype); a similarly coloured spot on pleuræ about halfway between base of wing and middle coxæ; lower part of pleuræ blackish grey, bare of pubescence, but with microscopic grey dust. *Abdomen* with ground-colour black, surface slightly roughened; the very short 1st segment with an extremely narrow bone-white hind margin; remainder of segments with similarly coloured hind margins, narrowest on 2nd segment, especially in the middle, broadest on 3rd, 4th, and 5th segments; the white margin does not reach the actual sides of the dorsal plates (except on 5th and perhaps 6th segments), though a fine pale yellowish-white line does actually continue right through to the extreme edge. The side-margin of the dorsal plate is occupied by a moderately broad black band, which practically dies away just beyond middle of 5th segment. Venter mainly bone-white; base of most segments blackish brown, narrowly in middle and broadly towards sides, leaving a whitish stripe below the black side-margins of the dorsal plates; towards each side of the 2nd, 3rd, 4th, and 5th segments is a rather large reddish-brown spot, fairly well demarcated from the black and bone-white parts. *Legs* with coxæ and about basal two-thirds of anterior femora and three-fourths of hind pair shining black, remainder reddish brown; tibiæ reddish brown, about middle half of hind pair blackish; all tarsi black. *Wings* absolutely clear and transparent practically to the extreme base; veins yellow, costa dark brown; thoracic squamæ pale dirty white, with whitish microscopic pubescence and a very narrow pale yellowish border; halteres brownish yellow.

Length, type 6 mm., cotype 4½ mm.

Described from two specimens in the British Museum from Nuwara Eliya, Ceylon, 18. v. 1891 (*type*), and 14. viii. 1891 (*Yerbury*).

In the cotype the reddish-brown spots towards the sides of the abdomen are less well delimited; the general ground-colour of the abdomen is more nearly very dark brown than black; the pale hind border on the 2nd segment is broader than in the type; and the red on the scutellar hind border is confined to the central part. This specimen bears a label: "rare, seated on grass stalks."

On comparing the present form with the very lengthy description of *O. gibbosus* given by Verrall, the agreement is certainly striking; but, though that author says he examined a large number of specimens, he makes no mention of the very conspicuous reddish-brown posterior calli and hind margin to the scutellum. It seems justifiable, therefore, to regard the present form as a distinct species.

Family BOMBYLIIDÆ.

Head rounded or transverse, generally narrower than, sometimes as wide as, rarely wider than thorax, and set closely on it; frons and face not sunk between the eyes, occiput generally enlarged posteriorly, except in SYSTROPINÆ; ocelli present. Eyes bare, usually contiguous or subcontiguous in the ♂, but in ANTHRACINÆ always considerably separated in both sexes, but sometimes more so in the ♀; in SYSTROPINÆ contiguous in both sexes. Proboscis generally very long, slender, and porrect, in some genera and in ANTHRACINÆ short and thicker; labella small or very small, rarely of moderate size; palpi with one or two joints, often inconspicuous. Antennæ porrect, approximate or remote at base; 3rd joint not annulated, but in some species with a suture near the base of the joint; style generally present, even if minute, sometimes with a constriction in the middle; sometimes it is replaced by a pencil of stiff hairs (*Argyramœba*).

Thorax in *Bombylius* and some other groups of genera with dense furry pubescence, often thicker and scale-like about the wing-roots; chætotactic bristles frequently present. In ANTHRACINÆ clusters of distinct scales often present, generally about the wing-roots, and when abundant the furry pubescence usually less dense. Metapleuræ generally densely pubescent, but hypopleuræ usually bare. Scutellum generally clothed like the thorax, sometimes with bristly hairs or with scales; metanotum small, hidden.

Abdomen in BOMBYLIINÆ "almost globular and clothed with dense furry pubescence, intermingled with which may be some longer straggling hairs; or (ANTHRACINÆ) more elongate, with almost parallel sides and less furry pubescence on at least the disc; or (*Cyllenia*, *Mulio*) with strong hind-marginal bristles; or (*Systropus*) very elongate, slender, and bare; the 6th to the 8th segments often difficult to trace under the furry pubescence" (*Verrall*). Genitalia inconspicuous; in the ♂ sometimes turned to one side; in ANTHRACINÆ the ovipositor in many species with a circlet of spines.*

Legs generally rather long, slender, and weak, used for alighting only. Thickened bristles "like little sticks" occur sometimes on the femora, especially on the hind pair; rows of inconspicuous spicules on the tibiæ, in *Toxophora* replaced by stick-like bristles; tibiæ generally with an apical circlet of bristles; tarsi with numerous short bristles; pulvilli two, often vestigial, empodia minute, claws of moderate size or small, or the front pair only smaller than the others.

* It has not always been possible to examine the genitalia satisfactorily. In such cases I have assumed the sex from the comparative width and shape of the frons.

Wings of moderate size or elongate. Venation conspicuous by the absence of the posterior cross-vein, the upper branch of the 5th vein forming for a longer or shorter distance (rarely punctiform) the lower side of the discal cell. Subcostal cell usually narrow, the auxiliary and 1st longitudinal veins sometimes almost touching. Submarginal cells normally two or three, rarely one only (*Cyrtosia*), sometimes four (*Hyperalonia*); * 3rd vein simple or forked, when the latter, the fork encloses the wing-tip. Discal cell normally present, rarely absent.† Three or four posterior cells; anal cell open or closed. Wings bare, but the costa bears small spines at the base, where there is often a patch of them of considerable size, often intermixed with scales. Alulæ small; alar squamæ rather large, with a thickly-set, rather long, broad, flattened scale-like fringe (*Anthrax*), or with a woolly, long marginal fringe, or moderately developed, with a short delicate fringe. Frenum sometimes distinctly widened before the angle, and bearing long hairs similar to those surrounding it, but otherwise the thoracic squamæ absent. Halteres small, often not easily seen.

Life-history. That of many species is more or less known. They are mostly parasitic on Lepidoptera, especially on the genus *Agrotis* and other Noctuids; also on the larvæ of bees, wasps, ichneumons and Tachinids that are themselves parasitic on Lepidopterous larvæ. *Callistoma* is parasitic in the egg-capsules of a locust. The Bombyliid larva is amphipneustic, cylindrical, rather flattened, 13-segmented; an obvious, though small, retractile head with well developed mouth-parts, papillate antennæ, and no eyes. The young larva is elongate, each thoracic segment with a pair of long setæ, the penultimate segment with two spiracles; the adult larva is obese and without setæ. Pupa free, mummy-like, with strong spines on head and anterior part; abdominal segments with chitinous hooklets. The pupa has prothoracic and seven pairs of abdominal spiracles, some species bearing transverse rows of spines on most of the segments. The BOMBYLIIDÆ contain many of the most brilliantly coloured Diptera and attain considerable size, the wings being frequently very prettily marked, whilst the body is often adorned with bright tufts of gorgeous pubescence or patches of coloured scales. The family is a very large one and is of world-wide range, occurring mostly in dry sunny or sandy localities, many of the species being exquisite hoverers. The members of the family may be recognised by absence of the posterior cross-vein (although this is not always obvious to the inexperienced), the few posterior cells, and the furry pubescence of most of the species. They are most nearly related to the CYRTIDÆ and the THEREVIDÆ.

* Additional cross-veins occasionally cause five submarginal cells in individuals, or, more rarely, in species.

† *Cyrtosia* and *Apolysis*, for example, amongst Palæarctic genera.

Table of Subfamilies.

1. Præfurca comparatively long, 2nd longitudinal vein originating in knee-shaped form from it, approximately opposite anterior cross-vein (at most half-way between origin of præfurca and the cross-vein, and this only in some species of *Argyramœba*);* antennæ widely separated at base; frons in ♂ nearly as wide as in ♀ ... . ANTHRACINÆ, p. 176.

   Præfurca comparatively short, 2nd vein originating acutely (not in knee-shaped form), always much nearer origin of præfurca than of anterior cross-vein; antennæ nearly always approximate at base; eyes in ♂ normally contiguous or nearly so, sometimes distinctly separated, but frons always much narrower than in ♀† ..

2. Abdomen, hind legs, and antennæ conspicuously long; eyes normally contiguous in both sexes; only three posterior cells; thorax not unusually humped; occiput concave; bare species .. .. SYSTROPINÆ, p. 289.

   Abdomen, legs, and antennæ (taken together) not conspicuously long; eyes normally contiguous in ♂, wide apart in ♀; posterior cells usually four; thorax often considerably humped; occiput generally inflated; bare, moderately or densely pubescent species ... . 3.

3. Abdomen rounded or oblong; often furry; antennæ never conspicuously long . 4.

   Abdomen more or less cylindrical, bare or with bristly hairs; antennæ very long, especially 1st joint; proboscis nearly always long. (Thorax more or less humped, generally with conspicuous bristles; abdomen drooping; prothorax sometimes forming a shield; body often with scaly pubescence) .... . . TOXOPHORINÆ, p. 286.

4. Abdomen short and rounded; thorax and abdomen generally with dense furry pubescence; proboscis long and with small labella; ‡ thorax generally arched; 2nd longitudinal vein never with a strong loop near tip; head generally narrower than thorax ... ... BOMBYLIINÆ, p. 259.

   Abdomen oblong, rather flattened, seldom really furry; proboscis generally short and with larger labella; thorax generally

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* At least two (European) exceptions are known, *Callistoma* and *Mulio*.

† Some species of *Usia* have the eyes in the ♂ widely separated, but they are easily recognised by their short, rounded bare abdomen.

‡ Except in a few non-Oriental genera.

flattened, thinly haired, but with some strong bristles towards sides; 2nd vein generally with a strong loop near tip; head generally as wide as thorax. (Four posterior cells; anterior cross-vein often sloping) LOMATIINÆ, p. 255.

The exact limits of the subfamilies is still to some extent a matter of opinion, as is also the location of certain genera. Williston ignores subfamilies altogether, and Verrall discusses their affinities in some detail.*

Subfamily ANTHRACINÆ.

Head broadly rounded or transverse, closely applied to the thorax, even though the occiput be enlarged; nearly as wide as thorax. Three ocelli. Eyes widely separated in both sexes; frons often barely narrower in ♂ than ♀, and often with an indentation in the middle of the hind margin. Proboscis porrect, short, rather thick; palpi inconspicuous, labella of moderate size. Antennæ widely separated at base, short, never elongate, 3rd joint conical or onion-shaped.

Thorax barely arched, oblong or nearly quadrate, with rounded corners, moderately or often densely pubescent. No bristles on dorsum, but presutural, supra-alar, and post-alar bristles frequently present, mingled with the pubescence. Scutellum semicircular, usually similarly clothed to the thoracic dorsum, sometimes with conspicuous bristles (*Hyperalonia*, *Exoprosopa*); metanotum usually hidden.

Abdomen a little longer than the thorax, slightly arched, generally approximately oblong, not infrequently obconical, but never tubular or depressed, usually with sparse or dense pubescence like the thorax, often with bands of scales on some of the segments and at the extremity or underside, and frequently with bunches of such scales or thick scale-like hairs at the basal corners.

Legs moderately long, comparatively slender; femora often with small spines on lower side; tibiæ nearly always with rows of small spicules and an apical circlet of small spines; tarsi with the joints more distinctly defined in some genera than others; pulvilli small or absent; ungues with or without a small tooth at the base.

Wings with præfurca long, extending nearly or quite to anterior cross-vein, the 2nd longitudinal vein originating in a knee-shaped angle, the 3rd vein being in a straight line with the præfurca. Auxiliary vein long; 1st longitudinal vein long, 2nd vein often forming a loop towards its tip, as does often the upper branch of the always forked 3rd vein. Two, three, or sometimes four (*Hyperalonia*) submarginal cells; † three or four posterior cells,

* 'British Flies,' v, p. 478.

† An additional veinlet adventitiously or specifically sometimes causes five submarginal cells.

the first usually open, this character not being of generic value. Upper branch of 5th vein forming a considerable portion of lower side of discal cell; the contact occasionally only punctiform. Anal cell always open to wing-border.

This subfamily is easily recognised from all others by the comparatively long præfurca and the sharp angle at the base of the 2nd longitudinal vein. The body is flattened and broad, the eyes well separated in both sexes, and the antennæ comparatively wide apart at the base.

Table of Genera.

1. Four submarginal cells	HYPERALONIA, Rond., [p. 178.
Three submarginal cells. ..	2.
Two submarginal cells	3.
2. Third antennal joint elongate conical, with terminal style bearing microscopic bristle	EXOPROSOPA, Macq., [p. 189.
Third antennal joint short onion-shaped, with styliform prolongation bearing a distinct pencil of hairs at tip.. .. .	SPOGOSTYLUM, Macq., [p. 213.
3. Third antennal joint short onion-shaped (sometimes more conical), with styliform prolongation always bisected near tip, and bearing an apical pencil of hairs .	ARGYRAMŒBA, Sch., [p. 214.
Third antennal joint forming a style-like cone with microscopic apical bristle; no pencil of hairs..	4.
4. Contact of discal cell with 3rd posterior not greatly longer than with 4th posterior.	LEPIDANTHRAX, O.S., [p. 232.
Contact of discal cell with 3rd posterior at least twice as long as with 4th, the latter contact sometimes merely punctiform	ANTHRAX, Scop., p. 234.

Several authors have endeavoured to split up some of the above genera, but such groups must be adopted with much caution.

When Osten-Sacken wrote on *Hyperalonia* in the 'Biologia Centrali-Americana,' his knowledge was admittedly confined practically to North and Central American species, and though Verrall, possessing the late Mr. Bigot's collection, in which numerous exotic species of both this genus and *Exoprosopa* are represented, includes the character "claws not toothed near the base" as generic in *Hyperalonia*, and "claws toothed near the base" in *Exoprosopa*, I am compelled to omit it as being incorrect. In three species of the former genus (*chrysolampis*, *sphinx*, and *suffusipennis*) a pair of perfectly distinct teeth are present on the posterior tarsi, and they are present, though small, in *tantalus*. In some other species they are absent, though I have not examined specimens of all the species available. It may be observed that Loew, in his treatise on the South African species, noted that some species of *Exoprosopa* had this tooth at the base of the ungues, but declined to regard it as a generic character. In those species of *Exoprosopa* that I have specially examined for this character the

teeth are present. The development or otherwise of the pulvilli in *Argyramœba* and *Anthrax* is likely to be inconstant, as it is hard to believe that species of an intermediate nature do not exist. After a more critical study of the species in this subfamily at my disposal and an examination of additional specimens, it has been possible to offer improved descriptions of some of my own species.

Genus **HYPERALONIA**, *Rond.*

Hyperalonia, Rondani, Archiv. Zool. Modena, iii, p. 57 (1863); Osten-Sacken, Biol. Cent.-Amer., Dipt. i, p. 89 (1886); Brunetti, Rec. Ind. Mus. ii, p. 438 (1909).
Velocia, Coquillett, Can. Ent. xviii, p. 158 (1886).

GENOTYPE, according to Coquillett (1910), "*Stomoxys morio*, F. (*Anthrax erythrocephalus*, F.), the 5th species, by present designation."

This genus differs from the other genera by having four submarginal cells; in some non-Oriental species even five are present. There are also four posterior cells. Further general characters are: the face moderately projecting; the third antennal joint forming an elongate cone with a distinct suture demarcating it from the style, which latter is nearly as long as the cone, with a minute appendage at its tip. The posterior legs are as strong as in *Exoprosopa*; the fore tarsi indistinctly jointed, without stronger bristles, but with delicate erect hairs on both sides; ungues minute.

Range. South Europe, Asia, North and South Africa, Australia, and North and South America.

As regards the Indian species of *Hyperalonia*, the general plan of chætotactic bristles is: several on the humeral calli (of different lengths), a few prealar ones and about four very powerful spines on the posterior calli, directed backwards, whilst there is always a row of strong bristles on the hind margin of the scutellum.

The vestiture of the legs consists generally of closely applied scales on the femora (often less easily discerned on the middle pair) and at least on the posterior tibiæ, being most conspicuous on the hind pair. The front legs generally bear soft pubescence only, the posterior femora and tibiæ with a row or rows of bristles.

One species, *H. flaviventris*, Dol., is described at additional length for the purpose of emphasising the generic characters.

Table of Species.

1. Wings dark blackish brown, without any considerable clear or nearly clear part; the clear part confined to a well-defined limited space in *tristis* and *dives* only . . . . . 2.
   Wings with apical part and a considerable portion of the posterior half, wholly or practically clear, but without any clear line of demarcation 7.

2.	Wings very dark brown, but always with a single limited clear space	3.
	Wings very dark brown, violet-tinged, no clear spaces whatever; in one species wings moderately dark smoke-brown	4.
	Wings pale or dark grey	6.
3.	Hind margin of wing narrowly clear; remainder of wing wholly dark	*dives*, Walk., p. 180.
	Wing-tip rather broadly clear; remainder of wing wholly dark; 2nd posterior cell much broader at base than tip	*tristis*, Wulp, p. 180.
4.	Wings uniformly very dark blackish brown, posterior part hardly lighter; 2nd posterior cell much broader at base than tip (except in *semifuscata*)	5.
	Wings very dark blackish brown, fading to dark grey towards hind border; 2nd posterior cell not greatly wider at base than tip . ..	*aurantiaca*, Guér., [p. 186.
	Wings moderately dark smoke-brown (variable); 2nd posterior cell much broader at base than tip	*sphinx*, F., p. 187.
5.	Median stripe of pubescence on venter white; antennæ all black ...	*tantalus*, F., p. 181.
	Median stripe of pubescence on venter yellow; 1st antennal joint reddish brown	*chrysolampis*, Jaen., [p. 182.
6.	The 2nd posterior cell slightly narrower at base than tip; wing colour fading gradually from costa to hind margin	*semifuscata*, Brun., [p. 188.
	The 2nd posterior cell nearly twice as wide at base as at tip; wing colour pale grey, with small darker suffusions	*suffusipennis*, Brun., [p. 188.
7.	Median stripe of pubescence on venter bright reddish yellow; antennæ red-brown	*flaviventris*, Dol., [p. 183.
	Median ventral stripe of pubescence snow-white; antennæ all black	*œnomaus*, Rond., [p. 185.

Though the characters adopted in the foregoing table may be somewhat difficult to follow, especially by the inexperienced student of this family, they are actually more reliable than any drawn from the coloration of the body or pubescence, and moreover are much more lasting. The following further notes may prove of assistance in separating these closely allied but perfectly valid species, of nearly all of which I have seen more than one example. Of the ten species in the table, only the last two, *flaviventris* and *œnomaus*, have any considerable extent of clear or practically clear surface of the wing, this being confined to the apical and posterior portions, and without any clear-cut line of demarcation, the dark part of the wing being the baso-costal band so common in ANTHRACINÆ. Secondly, of the remainder, *tristis* and *dives* have wholly dark wings, except for a very definite and clearly-cut pale space, in the former at the wing-tip, in the latter on the hind border.* Of the remaining species, *tantalus*, *chryso-*

* As regards *dives*, Walker is my authority, because if the clear part is not so sharply defined as he says, the species will fall into the group containing *flaviventris* and *œnomaus*, and a doubt as to its exact identity may then arise.

lampis, and *aurantiaca* stand out by the deep blackish brown, violet-tinged wings, and of these the latter has a strikingly marked abdomen, whilst the other two are quite definitely separated from one another by the colour of the stripe of pubescence on the belly. *H. sphinx*, F., has wings of a smoky-brown shade that is not easily confounded with the violet-brown of the species of the *tantalus* group; whilst the two remaining species, *semifuscata* and *suffusipennis*, have dark grey wings, and are somewhat easily recognised.

As regards *H. purpuraria*, Walk. (*Anthrax*), recorded in Van der Wulp's catalogue from East India, it is probably not Indian. Walker described it from Java, but it has not been recorded since, and the specimen is not in the British Museum.

133. **Hyperalonia dives**, *Walk.*

Anthrax dives, Walker, List Dipt. Brit. Mus. ii, p. 40 (1849).

♂ "Head black, with an orange-tawny tuft above between the eyes, which are dark red; there are also a few tawny hairs about the mouth, which, like the feelers, is black; chest brown, clothed with short brown and a few long black hairs, and adorned with a fringe of orange-tawny along the fore border and along each side; breast brown, having also a fringe of orange-tawny hairs along the fore border, and some hairs of this colour extend into the disc and mingle with the long black hairs that clothe it; scutcheon ferruginous, beset with stout black hairs and on the hind border with long black bristles; abdomen black above, clothed, especially towards the tip, with brown hairs and adorned along each side with orange-tawny hairs; these latter are most thick at the base, and there they slightly extend across the back; a band of white hairs occupies nearly the whole breadth of the 3rd segment; the tip of the abdomen and the whole of the underside are also clothed with orange-tawny hairs; legs ferruginous, clothed with short black hairs; hips, knees, and feet black; wings dark brown at the base and along the fore border till near the tip, the outline of this colour is regular and very oblique, and runs nearly to the base in a line almost parallel to the hind border; rest of wing colourless; veins black; poisers piceous.

"Length of body 8 lines, of the wings, 18 lines. Sylhet."

Type in the British Museum.

134. **Hyperalonia tristis**, *Wulp.*

Exoprosopa tristis, Wulp, Tijd. v. Ent. xi, p. 107, pl. iii, fig. 11 (1868).

♂ *Head* with frons not much narrower at vertex than above antennæ, where it is distinctly less than one-fourth the width of the head; blackish, with black hairs only on upper part, but with very small narrow yellow scales as well as black hairs on lower part; face reddish orange, the colour encroaching for a little distance on

the frons along the eye-margins, clothed with stiff black hairs and small yellow scales and some short bright yellow hairs around the yellowish mouth-opening; proboscis black; antennæ black; occiput black, with small yellow scales, at least near eye-margins, probably extending much further hindwards also, with a fringe of yellow hairs on the hinder margin. *Thorax* dark olive-brown, nearly black; anterior margin with thickly placed, long orange-yellow scales; a bunch of reddish-orange scales below the shoulders, and also apparently in the same places as they occur in *H. flaviventris*: short yellow hairs above the wings and on hind margin of dorsum; posterior calli reddish brown; scutellum red-brown, base more or less black, hind margin with short yellow hairs; macrochætæ of thorax and scutellum as in *H. flaviventris*. *Abdomen* black, with a slight violet tinge; a bunch of elongate orange scales at sides of 1st segment and traces of a few silvery-white scales on 6th towards the sides; venter black, with some scale-like yellow hairs and much longer fine yellow hairs, forming together a median stripe; genitalia very dark brown, shining, knob-like, with a row of spines at tip. *Legs* dark yellowish brown; femora and tibiæ with small bristles, strongest on hind tibiæ; femora with closely applied small concolorous scales. *Wings* rather dark brown; outer fourth of marginal cell and the three outer submarginal cells wholly or nearly wholly pale grey; alulæ and alar squamæ with a fringe of dark brown scales; halteres blackish brown, tips of knobs paler.

Length, 11–12½ mm.

Redescribed from one ♂ in the Indian Museum from Tenmalai, Travancore, 22. xi. 1908 (*Annandale*).

135. Hyperalonia tantalus, *F.*

Anthrax tantalus, Fabricius, Ent. Syst. iv, p. 260 (1794); Wiedemann, Auss. Zweifl. i, p. 255 (1828); Macquart, Hist. Nat. Dipt. i, p. 401 (1834).

Exoprosopa tantalus, Macquart, Dipt. Exot. ii, 1, p. 37 (1840); Kertész, Kat. Palæarc. Dipt. ii, p. 169; de Meijere, Tijd. v. Ent. l, p. 239 (1907).

Hyperalonia tantalus, Rondani, Ann. Mus. Genova, vii, p. 453 (1875); Brunetti, Rec. Ind. Mus. ii, p. 438 (1909).

Anthrax cæruleopennis, Doleschall, Nat. Tijd. Ned. Ind. xiv, p. 400, pl. ix, fig. 2 (1857).

♂ ♀ *Head* with frons barely one-third the width of the head above antennæ, narrowing to two-thirds of this width at vertex; black, with black hairs on upper part, and with black hairs mixed with yellow scale-like hairs on lower part; face reddish brown, with a blackish median longitudinal stripe, irregular in extent; mouth-border varying from reddish brown to yellowish white; proboscis and palpi black, concealed; antennæ wholly black; occiput black, with small yellow depressed hairs. *Thorax* black, with black pubescence, bearing bright orange or yellowish-orange scaly hairs on anterior margin and in bunches and patches as in

H. flaviventris and *chrysolampis*, and yellow hairs above wing-base and on hind margin of dorsum; macrochætæ as in those species; posterior calli reddish brown. Scutellum reddish brown, base more or less black, with black pubescence and with a row of spines and short yellow hairs on hind margin. *Abdomen* almost entirely as in *H. chrysolampis*, but the silvery-white scale-spots on 6th and 7th segments more elongate, nearly attaining the side-margins; a median ventral stripe of small whitish scaly hairs, no yellow hair whatever being present; genitalia concealed, yellowish brown, with black bristles in ♂, and yellowish with an apical circlet of short black spines in ♀ *Legs* black, sometimes a very dark brown tinge to the tibiæ; vestiture as in *H. chrysolampis*. *Wings* very dark brown, with a violet tinge; alulæ, alar squamæ, and halteres as in *H. chrysolampis*.

Length, 13–16 mm.

Redescribed from several specimens in the Indian Museum.

Ranjitsing, Darjiling Distr.; Khatgodam, Naini Tal Distr., 23. ix. 1915; Katmandu and Soondrijal, Nepal; Sadiya and Sibsagar, Assam; Tranquebar; Tenasserim; Sumatra; Java; Berlinhafen, Papua; Borneo; Celebes; China; Japan.

Type in the Wiedemann collection.

136. Hyperalonia chrysolampis, *Jaen.*

Exoprosopa chrysolampis, Jaennicke, Abh. Senck. Nat. Ges. vi, p. 344, pl. xliii, fig. 8 (1867).

Hyperalonia chrysolampis, Brunetti, Rec. Ind. Mus. ii, p. 439 (1909); de Meijere, Tijd. v. Ent. liv, p. 295 (1911).

♂ ♀ *Head* with frons barely one-third width of head above antennæ, narrowing to two-thirds of this width at vertex; dark olive-brown, with short black pubescence, with which is mixed on the lower half small bright yellow scale-like hairs; ocellar triangle small, reddish brown; face darker, blackish, more or less reddish brown along inner margin of eyes, clothed with more bristly black hairs than the frons, and yellow scale-like hairs; mouth-opening with short yellow hairs; proboscis and palpi black; 1st antennal joint reddish brown, 2nd and 3rd black, two basal joints bristly; occiput with short yellow hairs, its hind border with a fringe of similarly coloured hairs. *Thorax* black, with short black pubescence; thick bright orange-yellow scale-like hairs on anterior margin, and bunches or patches of concolorous hairs situated as in *H. flaviventris*, a few short yellow hairs above the wing-base and on hind margin of dorsum; sides and lower part black; scutellum black, with posterior part more or less dull reddish brown, black pubescent, hind margin with short yellow hairs and a row of spines. Macrochætæ as in *H. flaviventris*. *Abdomen* black, with short black depressed pubescence; 3rd segment with a distinct basal band of small silvery-white narrow scales, which is narrowest in middle, and more than half the length of the segment towards the sides; a basal spot of similar

scales on each side of the middle on 6th and 7th segments; at sides of 1st segment a bunch of bright orange elongate scales, sides of the remaining segments with long black bristly pubescence. Venter blackish, with very short black pubescence; towards middle of hind margin of most of the segments are some small bright yellow scales and a median band, not attaining tip of abdomen, of long, fine hairs of similar colour; genitalia concealed, apparently much as in *H. flaviventris*. *Legs* black; fore femora and tibiæ with soft pubescence, posterior pairs with black bristles; all femora with closely applied minute black scales; tarsi with short black pubescence; general vestiture of legs much as in *H. flaviventris*. *Wings* wholly dark brown, with a distinct violet tinge; alulæ and alar squamæ as in *H. flaviventris*; halteres dull brown.

Length, 13–20 mm.

Redescribed from several specimens in the Indian Museum: Sikkim; Bhim Tal, 22–27. ix. 1906 (*Annandale*); Java; Kina Balu, Borneo; Moluccas.

Type in the Frankfort Museum.

Jaennecke's original description of this species is wonderfully accurate. It may be recognised by the trio of characters, the red 1st antennal joint, the yellow stripe of hairs on the venter, and the wholly black legs.

137. **Hyperalonia flaviventris,** *Dol.*

Anthrax flaviventris, Doleschall, Nat. Tijd. Ned. Ind. xiv, p. 400 (1857).

Hyperalonia flaviventris, Osten-Sacken, Berl. Ent. Zeits. xxvi, p. 112; Brunetti, Rec. Ind. Mus. ii, p. 441 (1909).

♂ ♀ *Head* with frons above antennæ one-third of the width of the head, narrowing to half this width at the vertex, dull mouse-brown, clothed with rather numerous short erect black hairs, with some small narrow yellow scale-like hairs intermixed, the latter preponderating on lower part; ocellar triangle dull reddish brown; face orange, liberally besprinkled with short black hairs and some soft golden-yellow hairs around mouth-opening; lower part of head immediately below eyes (where it joins the occiput) yellowish white, bare. Antennæ reddish brown; 2nd joint barely half as long as 1st, both with black bristles; 3rd joint elongate conical, bare, nearly as long as 1st and 2nd together, and with a style three-fourths as long as the joint, bearing a microscopic apical appendage. Proboscis blackish brown, with large reddish-brown labella, slightly pubescent. Occiput much puffed out, mouse-brown, covered with small narrow bright yellow scales or scale-like hairs, closely affixed; posterior edge o occiput with a fringe of light yellow hairs. *Thorax* blackish, with sparse short blackish hairs; anterior margin with dense, long, narrow, bright fiery reddish-orange scales, and dense bunches of similar orange scales or scale-like bristly hairs occur below the

anterior margin, on the mesopleuræ and metapleuræ, and below the posterior calli; while short bristly concolorous hairs occur above the wing; humeral calli greyish, with some long black hairs; some powerful black spines in front of and above the wing-base; posterior calli brownish, with short black hairs and about six powerful black spines directed posteriorly; scutellum reddish brown, with soft short black pubescence and a row of slightly curved black spines on hind margin. *Abdomen* black, with short black bristly depressed pubescence; 3rd segment nearly covered from the base with small yellowish-white scales, 6th and 7th segments with similar though narrower bands. A bunch of long narrow reddish-orange scales at the sides of the 1st and the base of the 2nd segments, and coarse bristly concolorous hairs extending along the sides of all the segments to the tip, where they are continued across the posterior margin of the last segment; ground-colour of 2nd segment a little dull reddish brown at the side; venter brownish grey, hind margins of segment with short yellow scale-like hairs; there is also a more or less distinct median stripe of much longer similarly coloured hairs, and a few of such longer hairs are scattered irregularly over the surface. Genitalia bright orange, placed sideways, with yellower parts; an oblong dorsal plate with rounded, rather projecting, carmine-tinted hind corners, a pair of claspers and an upper tubular piece are apparent, all with yellow pubescence, but the whole organ is withdrawn considerably. *Legs* with coxæ blackish grey, with some stiff black bristles, especially on hinder pair, and a few reddish-orange hairs; femora and tibiæ ferruginous, tarsi blackish; femora covered with small closely applied yellow scales, and with tiny black bristles, the fore pair with a moderate amount of longer soft black hairs, the posterior pairs with a row of obvious black spines of moderate size below; fore tibiæ with a few closely applied yellow scales, black pubescence, and a few bristles; middle and hind tibiæ with more obvious scales and distinct rows of short black bristles, both scales and bristles stronger, and the former more outstanding on the hind pair; tarsi with very short bristly black pubescence. *Wings* clear, hyaline, ribbed; a powerful curved black spine at base of costa, which latter as far as the humeral cross-vein is closely set with short black spines, as well as the upper basal corner of the wing-surface itself; venation normal, veins reddish brown; an oblique dark brown band extends from the tip of the auxiliary vein (though the colour fills out the subcostal cell to its tip) to the anal border of the wing, embracing the anterior cross-vein, basal half of discal cell, 2nd basal cell wholly, basal half of anal cell and less than basal half of axillary cell, the limitation of the colour approximately parallel with hind border of wing; anal angle distinct, with fringe of dirty brownish elongate scales; alar squamæ large and compact, with a similar fringe of longer brownish-yellow elongate scales: halteres brownish yellow.

Length, 13–20 mm.

Redescribed from 3 ♂♂ and 2 ♀♀ in the Indian Museum in indifferent condition, the characters drawn mainly from a ♂ from Mergui, Tenasserim; Trivandrum, S. India; Amboina.

138. **Hyperalonia œnomaus,** *Rond.*

Hyperalonia œnomaus, Rondani, Ann. Mus. Gen. vii, p. 453 (1875); Brunetti, Rec. Ind. Mus. ii, p. 442 (1909).

♂ ♀ *Head* with frons (slightly narrower in ♂ than ♀) and face dark mouse-brown or blackish, with black hairs on upper part of former, and the same, mixed with thin scale-like yellow hairs, on rest of frons and on face; frons in ♀ only a little narrower at vertex than above antennæ, where it is distinctly less than one-third the width of the head; face sometimes a little reddish at margins; mouth-opening from reddish brown to pale brownish yellow; proboscis dark brown; antennæ black or nearly so, sometimes tinged with dark reddish brown; remainder of head as in *H. flaviventris*. *Thorax* black, with black pubescence, adorned with orange scaly pubescence and bristles as in *H. flaviventris*; scutellum black, posterior half more or less reddish brown, vestiture as in *H. flaviventris*. *Abdomen* black, with black pubescence; a bunch of long orange-yellow scales at sides of 2nd segment, and from thence to the tip the sides with coarse black bristly hairs; 3rd segment with a transverse band as in *H. flaviventris*, but the colour of the scales graduates from yellow (in the median line) to white (towards the margins of the segment); the 6th and 7th segments each bear a pair of white or yellowish-white scale spots, which are more remote from each other than in *H. chrysolampis* and nearer the edges of the abdomen. In the ♂ the whole dorsum of the 5th, 6th, and 7th segments is covered with silvery-white scales. Venter black, 2nd and 3rd segments covered nearly to the side-margins with small whitish scales, and these scales continued in the median line only on the next two segments; over the four segments is a median stripe of fine long white hairs; genitalia apparently as in other species, placed completely sideways in ♂ *Legs* very dark brown, almost black, vestiture as in allied species. *Wings* in ♀ nearly clear, with the dark oblique band with a less well-defined margin than in *H. flaviventris*, running irregularly from tip of 1st longitudinal vein, passing well beyond anterior cross-vein to anal angle of wing, thus filling the inner submarginal cell and the 2nd basal cell, and half filling the discal, anal, and axillary cells; 2nd posterior cell about as wide at base as at tip. In one specimen the brown band fades away more gradually and extends further posteriorly. In the ♂ the hinder limit of the dark colour is practically straight, the discal half (diagonally) of the marginal cell is clear, as is also the 1st submarginal cell, except at its base; the clear part of the wing is more hyaline in the ♂

Length, 13–15 mm.

Redescribed from a ♂ from Peshoke Spur, Darjiling Distr. (*Lister*); 3 ♀♀ from Rungpo, Sikkim, 1400 ft., 6. ix. 1909; 2 ♀♀ from "Sikkim"; 1 ♀ from Mergui; and two ♂♂ from Sadiya—all in the Indian Museum; Sarawak; Philippines.

Type in Genoa Museum.

139. **Hyperalonia aurantiaca**, *Guér.*

Anthrax aurantiaca, Guérin, Icon. Règne Anim. iii (Ins.), p. 539, pl. xcv, fig. 6 (? 1843).

Hyperalonia aurantiaca, Brunetti, Rec. Ind. Mus. ii, p. 440 (1909).

Head with frons a little narrower on vertex than above antennæ, where it is barely one-third the width of the head; dark olive-brown with black pubescence, intermixed with small narrow bright yellow scale-like hairs, which are most numerous on the lower part; face yellowish, becoming pale creamy white about mouth-opening and on lower part of head; rather closely covered with similar yellow pubescence to that of the frons, but more hair-like, especially round the mouth-opening; proboscis as long as height of head, blackish brown, with a few whitish hairs; antennæ black, 1st and 2nd joints bristly; occiput black, with short yellow scale-like hairs around eye-margins. *Thorax* black, with bright yellow pubescence as in *H. sphinx*; paler hairs on sternopleuræ; posterior calli dark reddish brown; scutellum dark reddish brown, blackish at base, covered with short yellow hair, and the usual marginal row of spines. *Abdomen* black, with black pubescence, clothed almost entirely with yellow scale-like hairs, which are apparently absent from a broad median space from base to tip; a bunch of concolorous elongate scales at each side of base of abdomen, and a patch of silvery-white scale-like hairs at each side, contiguous to the margins, of the 6th and 7th segments; sides of abdomen with coarse black hairs. Venter black, with silvery-white scales; almost wholly covering 2nd and 3rd segments and continued broadly in the median line over 4th and 5th segments, a median line also of sparse long fine white hairs; genitalia concealed, apparently normal. *Legs* very dark brown, nearly black; coxæ ash-grey, with long pale yellowish hairs and some strong long black spines; femora and tibiæ with small closely applied grey scales, difficult to perceive on middle femora and fore tibiæ; fore femora and tibiæ without obvious bristles, but these are present on posterior femora and tibiæ; tarsi black, pubescent. *Wings* moderately dark brown on anterior half, the colour fading to grey posteriorly, with a violet iridescence in certain lights; sometimes the discs of the cells on the hinder half of wing a little paler; 2nd posterior cell distinctly wider at base than tip; halteres brownish yellow; alar squamæ with a fringe of long yellow scales.

Length, 11–13 mm.

Redescribed from a perfect ♀ from Siripur, Saran, North Bengal, 25. ix. 1910; it occurs also at Chapra, Bengal (*Mackenzie*).

140. Hyperalonia sphinx, *F.*

Bibio sphinx, Fabricius, Mant. Ins. ii, p. 329 (1787).
Anthrax sphinx, Fabricius, Syst. Antl. p. 126; Wiedemann, Auss. Zweifl. i, p. 258 (1828); Macquart, Dipt. Exot. ii, 1, p. 37 (1840).
Hyperalonia sphinx, Brunetti, Rec. Ind. Mus. ii, p. 440 (1909).

♀ *Head* with frons not greatly wider above antennæ, where it forms one-third of the width of the head, than at vertex; dark reddish brown; face of similar colour, both closely covered with short elongate bright yellow scale-like hairs, some broader concolorous definite scales near eye-margins below antennæ, and some concolorous soft hairs around mouth-opening, which latter is pale yellowish white; frons with black bristles from vertex nearly to antennæ; proboscis dark brown; palpi elongate, filiform, pale yellow, with a few concolorous hairs; antennal 1st and 2nd joints yellow, 1st with rather long yellow hairs, 2nd with a row of small black spines above at tip; 3rd joint black; occiput blackish, with small depressed yellow hairs. *Thorax* and scutellum dark reddish brown; dorsum of both, with the humeral calli, wholly covered with close bright yellow scale-like hairs; anterior margin, mesopleuræ, sternopleuræ, and metapleuræ covered with dense yellow elongate scales; a bunch of similar scales just below posterior calli; some isolated long black hairs on anterior part of dorsum and about hind margin; three or four powerful black spines in front of wing-base, and four exceptionally strong ones on each posterior callus, directed backwards. *Abdomen* dull dark reddish brown, covered with short black bristly hairs and short yellow scale-like hairs, and with rather thick longer concolorous hair at sides; a bunch of concolorous elongate scales at sides of 1st segment; venter lighter reddish brown, with a moderate amount of rather long yellow hairs placed mostly towards hind margin of segments. *Legs* rather bright ferruginous; femora and tibiæ with closely applied small elongate pale yellow scales, sometimes not readily discernible on middle femora, and apparently absent from apical part of fore femora; middle femora rather broadened and flattened vertically, with several distinct short black spines near tip on front side; front femora with soft yellow hairs, both front and middle femora with a few small black bristles; hind pair with rows of black bristles of moderate size below; tarsi black, with normal pubescence. *Wings* uniformly smoke-grey, sometimes with a slight yellowish-brown tinge and a similar fringe at base; 2nd posterior cell twice as wide at base as at tip; alulæ with a fringe of elongate smoke-grey scales; alar squamæ with a similar fringe of yellowish scales; halteres small, bright tawny yellow.

Length, 9–12 mm.

Redescribed chiefly from a perfect ♀ in the Indian Museum from Puri, Orissa, 16–20. viii. 1911, and an example from Bulsar, Bombay, 20. vi. 1904; near Bombay City, 21. iii. 1905, on seaweed; Chapra, Bengal; Chandipore, Orissa Coast, 3–7. vi. 1915

(*Gravely*); Trivandrum, 13. xi. 1908 (*Annandale*); Coimbatore, S. India, 29. vii. 1912; Colombo, 1. vii. 1904 (*Brunetti*), vi. 1894 (*E. E. Green*); Trincomali, 17. vii. 1890 (*Col. Yerbury*).

Types in Fabricius's and Wiedemann's collections.

141. **Hyperalonia suffusipennis**, *Brun.* (Pl. III, fig. 1.)

Hyperalonia suffusipennis, Brunetti, Rec. Ind. Mus. ii, p. 462 (1909).

Head with vertex dark grey to blackish; frons orange, paling gradually to the yellow face, or face also all orange, both with elongate chrome-yellow scales, with black hairs intermixed on upper part of frons; lower part of frons and the face with yellow pubescence; mouth-opening with pale yellow hairs; proboscis blackish brown; palpi long, thin, yellow; antennæ orange-red, 1st and 2nd joints with bristly yellow hairs on each side and some short black bristles above; 3rd joint black. *Thorax* black, with rather thick short yellowish depressed hairs on dorsum, and thick long bristly whitish hairs below the wings; elongate yellowish scales thickly on anterior margin, below shoulders, and on posterior calli; scutellum tawny brown, with short thick yellow hairs and a row of stiff long black spines on posterior border. *Abdomen* blackish, dark reddish towards the sides of the 2nd and 3rd segments; dorsum covered with moderately thick yellowish scale-like hairs, intermixed with black pubescence; a large fan-like bunch of elongate dirty yellowish scales at sides of 1st and 2nd segments; venter with whitish hairs. *Legs* brownish tawny, coxæ with whitish hairs, tarsi nearly black. *Wings* pale grey, darker and more yellowish on anterior margin and at base; a slight but distinct suffusion at nearly all the junctures of the veins and cross-veins; halteres pale yellowish white; alulæ and alar squamæ with a thick fringe of yellow scales.

Length, 15 mm.

Described from two ♀♀ in good condition, in the Indian Museum, from the Purneah District, India, and one from Jaulasal, Naini Tal Distr., 11. iv. 1910; a fourth specimen from Dehra Dun, v. 1914 (*Chatterjee*); and a darker variety from Coorg, S. India, 1. xi. 1915 (*Hannyngton*).

A very distinct species.

142. **Hyperalonia semifuscata**, *Brun.* (Pl. III, fig. 2.)

Hyperalonia semifuscata, Brunetti, Rec. Ind. Mus. vii, p. 266 (1912).

♀ *Head* much developed behind eyes; frons one-third of width of head at level of antennæ, narrowing at vertex to half this width, blackish, with yellowish scales and long black hairs; face with brighter and thicker yellow hairs; mouth-border broadly orange-yellow, with yellow hairs; proboscis dark brown; antennæ reddish brown,* 3rd joint very elongate-conical, with a distinct

* The 2nd and 3rd joints of the antennæ have since turned blackish.

style; occiput blackish, with some pale yellow scales on orbital margin and yellow hairs over the hind border. *Thorax* black; front part of dorsum and around and below shoulders with thick long bright yellow scales; centre of dorsum with only sparse short yellow and black hairs; below the wing the hairs are nearly white and bristly, behind the wing some long bright yellow scales; some strong and very long black bristles on posterior corners of dorsum, and two or three (or thereabouts) before the wing; some long stiff black hairs on humeral calli; scutellum dull reddish brown, with sparse depressed short yellow hairs, erect short black hairs, and a row of black bristles along hind border. *Abdomen* black, with uniformly distributed short black hairs; 3rd, 6th and 7th segments each with a band of small dirty white scales (those of the 3rd more yellowish) occupying the greater part of their dorsal surfaces, the bands on the 6th and 7th segments less conspicuous; sides of 1st and 2nd segments with long scale-like yellow hairs; venter blackish, with yellowish pubescence, the basal part a little paler, with whitish hairs. *Legs* with coxæ black; femora brownish yellow, hind pair blackish towards tips; tibiæ a little darker brown, hind tibiæ and all tarsi black; fore femora with some black hairs on hinder side; posterior femora and tibiæ with rows of short black bristles. All femora and posterior tibiæ with closely applied yellow scales; the whole of the tibiæ and tarsi with minute black microscopic pubescence. *Wings* dark grey, the anterior half (about), except at tips, moderately dark blackish brown, the colour insensibly dying away along the veins behind the middle of the wing; halteres yellowish.

Length, 10 mm.

Described from two ♀ ♀ from Mahabaleshwar, Satara District, Bombay Presidency, 4200 ft., 13–16. iv. 1912 (*Gravely*); in the Indian Museum.

Genus **EXOPROSOPA**, *Macq.*

Exoprosopa, Macquart, Dipt. Exot. ii, pt. i, p. 35 (1840); Brunetti, Rec. Ind. Mus. ii, pp. 443, 447 (1909).
Litorhynchus, Macquart, Dipt. Exot. ii, pt. 1, p. 78 (1840).
Trinaria, Mulsant, Mém. Acad. Sci. Lyon, (2) ii, p. 20 (1852).
Argyrospyla, Rondani, Dipt. Ital. Prod. i, p. 162 (1856).
Heteralonia, Rondani, Arch. Zool. Modena, iii, (*sep.*) p. 57 (1863).
Defilippia, Lioy, Atti Istit. Veneto, (3) ix, p. 733 (1864).
Argyrospila, Verrall apud Scudder, Nomen. Zool. p. 32 (1882).
Exoptata, Coquillett, Can. Ent. xix, p. 13 (1887).

GENOTYPE, *Bibio capucina*, F. (as *pandora*, F.); by Rondani's designation.

Head approximately semicircular, as broad as or a little broader than the thorax; occiput inflated, often considerably so; eyes moderately approximate on vertex or wide apart; frons barely narrower in ♂; ocelli present; face generally conically projecting,

sometimes convex only; proboscis variable in length, often withdrawn; palpi small, thin. Antennæ porrect, short, wide apart at base; 1st joint short, cylindrical; 2nd short, wider at tip than base; 3rd forming an irregular elongate cone, with a longer or shorter style,* separated from the 3rd joint by a distinct suture, with a microscopic bristle at the tip. *Thorax* quadrate or short oblong, with rounded corners, often with fan-like bunches of distinct scales or scale-like bristly hairs in front, below the humeri, around the wing-roots, on the pleuræ, and occasionally on other parts; scutellum broad, rather large, generally with bristles on posterior margin; metanotum concealed; thorax and scutellum generally with rather thick pubescence. *Abdomen* slightly curved, longer than thorax, but often not greatly so, oblong, in a few species almost obconical, usually with depressed short pubescence and with transverse bands of scales or scale-like hairs on dorsum and frequently on underside also, the pubescence generally longer and thicker on each side at the base. *Legs* rather long and always slender; all tibiæ without spinules; tarsi rather indistinctly jointed; fore legs shorter, posterior legs stronger and longer, in some species with scaly pubescence; ungues small, generally with a small tooth at their base; pulvilli absent or vestigial. *Wings* with three submarginal cells; often a short space along the base of the costa with brilliant white or coloured scales; venation otherwise as in *Hyperalonia*.

Range. World-wide.

It is probable that some of the characters admitted as generic are more or less plastic, such as the distinctness of the tooth at the base of the ungues, which Osten-Sacken claims to be always present, even if very small. He also asserted that the front tarsi are more tapering towards the tip in the ♂ than in the ♀, and that "the length of the antennal style is variable, usually in inverse ratio to the length of the 3rd joint." His characters were drawn up on North and Central American species, a few European and two Australian forms. I have not ventured to include all these points as definite generic characters.

Table of Species.

1. First posterior cell closed	2.
First posterior cell open†	3.
2. Wings wholly bright yellow to beyond middle, a narrow brown band in apical part	[p. 192. *flavipennis*, Brun.,
Wings yellow at base, with two broad brown bands, one before, one beyond, the middle.	[p. 193. *flammea*, Brun.,

* Exceptions occur. *E. stupida*, Rossi, a European species, has no distinct antennal style, the 3rd joint being a long tapering cone ending in a microscopic bristle. Probably there are also other exceptions.

† Often closed adventitiously in *E. insulata*.

3(*a*). Wings wholly black or blackish brown, or with a very small clear spot only . 4.

(*b*). Wings clear, with a broad basal and median transverse band, the latter sometimes reaching hind border, both bands joined on the costa; a somewhat isolated species. .... *lar*, F., p. 194.

(*c*). Wings dark or light grey, yellowish, or nearly clear; always with a pattern of darker marks, with small infuscations, or with baso-costal band ... 5.

(*d*). Wings clear, or at most with a very narrow dark anterior margin . 12.

4. Hind tibiæ with dense black hairs. *pennipes*, Wied., p. 197.
Hind tibiæ without such hairs ... ... *latipennis*, Brun., p. 198.

5. Second posterior cell twice as wide at base as tip .. .. *lateralis*, Brun., p. 198.
Second posterior cell as wide at tip as at base or wider... .. .. 6.

6. Baso-anterior half of wing considerably dark, with or without small infuscations on the veins in the clear part ... . 7.
Baso-anterior half of wing barely darker than the pale grey remainder; slight suffusions only on some of the veins 11.

7. Abdominal ground-colour chestnut-brown; antennæ yellowish; legs brown; no abdominal white scale-spots. .. *annandalei*, Brun., [p. 199.
Abdomen and antennæ black. .. . 8.

8. Dorsum of abdomen with white scale-spots 9.
Dorsum of abdomen without white scale-spots .. .. 10.

9. Larger species, 14 mm.; antennal style normal .. .. *maculiventris*, sp. n., [p. 200.
Smaller species, 8 mm.; antennal style as long as 3rd joint .. .. *stylata*, sp. n., p. 201.

10. Clear part of wing with several isolated dark spots .. . . *insulata*, Walk., p. 203.
Clear part of wing without any isolated dark spots .. .. *puerula*, sp. n., p. 205.

11. Scutellum and antennæ black; all the abdominal segments with a band of yellowish white pubescence .... *bengalensis*, Macq., [p. 206.
Scutellum and antennæ reddish yellow or brown; the 2nd abdominal segment with basal band of whitish pubescence* *brahma*, Sch., p. 206.

12. Length 20 mm. *niveiventris*, Brun., [p. 207.
Length 7–10 mm. .. 13.

13. Antennæ reddish brown; pubescence on anterior margin of thorax whitish; scutellum all black; wing wholly clear; venter with small snow-white scales at bases of segments .... *vitripennis*, Brun., [p. 209.
Antennæ black; thorax with bright yellow thick scale-like pubescence; scutellum

* After Schiner; *E. bengalensis* and *brahma* may possibly be synonymous.

reddish brown; wing clear, costal and subcostal cells pale yellowish grey; venter with soft snow-white hairs in middle. . . . . *vitrea*, Big., p. 210.

Antennæ black, ferruginous at base; "thorax with tawny hairs"; scutellum and thorax ferruginous; dorsum of abdomen with fringe of pale yellow hairs on fore border of each segment, and "more completely clothed on the underside"; wings a little greyish, slightly tawny at base and on fore border *basifascia*, Walk., [p. 211.

143. **Exoprosopa flavipennis**, *Brun.*

Exoprosopa flavipennis, Brunetti, Rec. Ind. Mus. ii, p. 465 (1909).

♀ *Head* with frons and ocelli as in *flammea*; frons orange, with close short golden-orange hairs; mouth-border yellow; proboscis brown, shorter than the head; eyes reddish brown, bare, with small, uniform facets; back of head reddish orange, bare, considerably prominent, with a narrow fringe of very short bright yellow hairs on the margin of the cavity behind. Antennæ orange; first two joints sub-cylindrical, wider at tip, with yellow hairs; 2nd shorter than 1st; 3rd joint twice as long as first two together, bare, the upper side quite straight, the underside rapidly narrowing from base to tip, a very distinct cylindrical style at tip. *Thorax* ferruginous orange, with black dorsum and blackish-grey underside; a fringe of long yellow hair-like scales on anterior margin; a bunch of fiery orange-red bristly scale-like hairs on shoulders, and shorter similar ones on the humeral calli; the dorsum clothed with moderately close, short orange hairs; several long fiery orange-red bristles, directed backwards on the posterior calli; underside nearly bare, a few blackish hairs here and there. Scutellum orange-red, covered with short, similarly coloured pubescence; posterior margin with a horizontal row of concolorous strong bristles. *Abdomen* sub-conical; ground-colour black, apparently with short, close, black pubescence. A bunch of elongate orange-red scales at the shoulders of the 1st segment; sides of 2nd segment dull reddish; venter black, unmarked; genital apparatus in one specimen, orange, subspherical, slightly protruding, and apparently twisted to the left. *Legs* with coxæ and femora dark brown; anterior tibiæ brownish yellow, hind pair black; all the knees pale; tarsi black; fore legs practically bare, posterior ones minutely pubescent and with distinct black bristles, which are stronger on the hind pair; posterior tarsi closely pubescent, with black bristles on underside. *Wings* with first posterior cell closed some distance before the border; rather more than the proximal half bright orange-yellow, apical part and a narrow border along the posterior margin almost to the base, quite clear; an intermediate dark brown, ill-defined cross-band, commencing at the upper edge of the marginal cell opposite tip

of auxiliary vein, the width of the band being about one-third of the length of the 1st submarginal cell, across the middle of which it passes; continuing across the middle of the closed portion of the 1st posterior cell, the distal half of the discal cell, and the bases of the 2nd and 3rd posterior cells, after which it is narrowed to a streak and turning, extends towards the base of the wing, separating the yellow part from the clear margin. Alulæ with fringe of dirty grey elongate scales; alar squamæ reddish orange, with a short dense fringe of concolorous elongate scales.

Length, 14–18 mm.

Described from two specimens from Pusa, Bengal. One (type) in the Pusa collection, taken 19. iv. 1907; the other in the Indian Museum collection, taken 25. v. 1906, now partly greasy.

E. flammea, Brun., and *flavipennis*, Brun., are distinguished from all the other Eastern *Exoprosopa* known to me by the 1st posterior cell being closed at some distance before the border, the 4th longitudinal vein meeting the 3rd before the origin of the anterior branch of the latter (in *flammea*), or just below it (in *flavipennis*). They therefore belong to the group for which Rondani established the genus *Argyrospyla* (emended by Verrall to *Argyrospila*), but which the late Baron Osten-Sacken says (Biol. Cent.-Am., Dipt. i, p. 78) cannot be sustained, this character in various species showing all stages between a closed and open cell, sometimes even in the same species.

144. Exoprosopa flammea, *Brun.*

Exoprosopa flammea, Brunetti, Rec. Ind. Mus. ii, p. 466 (1909).

♀ *Head* with entire frons and face orange-yellow, covered with short golden-yellow hairs; lemon-yellow round the mouth, with short bright yellow hairs; frons at level of antennæ one-third the width of the head, narrowing towards vertex; ocelli small, close together in front of the vertex; antennæ missing, except 1st joint which is reddish; proboscis brown, shorter than length of head; eyes dark reddish brown, facets very small, uniform; occiput brick-red, rather prominent, with sparse short golden-yellow hairs. *Thorax* cinereous; humeral and posterior calli orange-tawny, the latter bearing five or six concolorous spines pointing backwards; the anterior border and shoulders are covered with thick long fiery reddish-yellow bristle-like scales, which are also abundant below the shoulders and behind the wings; the dorsum (slightly denuded) is evidently lightly clothed with short orange-yellow hairs; underside of thorax cinereous, with a moderate amount of orange-yellow hair. Scutellum reddish brown, the posterior margin bearing a row of concolorous strong bristles directed backwards; dorsum with sparse yellowish hairs. *Abdomen* sub-conical; ground-colour chiefly reddish brown; 2nd segment with a narrow anterior and rather wider posterior band connected by a thin dorsal stripe; a rather wide irregular,

not well-defined black transverse band on 3rd segment, which is repeated less distinctly on the following two or three segments. The extreme posterior border of all the segments is reddish brown, and the whole dorsum is covered lightly with short, bright orange hairs, which become brightest, longest, and fiery red at the abdominal tip; a bunch of fiery-orange elongate scales at sides of 1st segment. Venter cinereous, covered with short orange hairs; posterior borders of all the segments orange-yellow. *Legs* with coxæ, femora, and most of the tibiæ reddish orange; the tibiæ towards the tips (especially the hind pair) and all the tarsi black; the middle femora have a few black short spines below, the hind pair a row of stronger ones; the posterior tibiæ are beset with short black bristles (longer on the hind pair) and have a circlet of strong black spines at the tip, and the whole legs, especially the tibiæ and tarsi, are minutely but densely spinose. *Wings* clear; first posterior cell closed at some distance before the border, the 4th longitudinal vein joining the 3rd halfway between fork of latter and the wing-border. Two broad dark brown bands; base of wing bright orange-yellow, the colour extending across the wing from the costa to (and including) the alula, and reaching distally to just within the two basal cells; the costal cell orange-yellowish, also a spot on and over the discal cross-vein, and another small spot in the centre of the upper basal cell. The first brown band begins in the upper basal cell, which it fills, extending posteriorly, filling the 2nd basal cell and basal fourth of discal cell, thence narrowing to the hind border of the wing, leaving about the distal fourth of both the anal and axillary cells clear; the second band begins approximately on the costa, blending with the orange colour of the costal cell, fills three-fourths of the 1st submarginal and 1st posterior cells, thence narrowing somewhat, it fills nearly the distal half of the discal cell and terminates distinctly clear of the posterior margin of wing, entering the 2nd and 3rd posterior cells; a small round quite clear spot is in the extreme upper angle of the lower basal cell. A few very short stiff black bristles at the base of the costa, and some short close yellowish-orange hairs on the margin of the alulæ and the orange tegulæ; halteres yellow.

Length, 18 mm.

Described from a single ♀ (now headless) in the Indian Museum collection, taken at Pusa, Bengal, 17. iv. 1907; other specimens are from Pusa, 1. v. 1911, at light (*Howlett*); Pusa, 3. iv. 1914; Trincomali, Ceylon, 25. vi. 1891 (*Col. Yerbury*).

This species closely resembles *E. lar*, F., in the shape of the wing-markings.

145. **Exoprosopa lar**, *F.* (Pl. III, fig. 3.)

Bibio lar, Fabricius, Sp. Ins. ii, p. 414 (1781).
Anthrax lar, Wiedemann, Auss. Zweifl. i, p. 268 (1828).
Anthrax collaris, Wiedemann, Auss. Zweifl. i, p. 271 (1828)
Walker, List Dipt. Brit. Mus. ii, p. 247, ♀ (1849).

Litorhynchus collaris, Macquart, Dipt. Exot. ii, 1, p. 80 (1840).
Anthrax rugicollis, Saunders, Tr. Ent. Soc. Lond. iii, p. 59, pl. v, fig. 5 (1841).
Exoprosopa binotata, Macquart, Dipt. Exot. Supp. 5, p. 89 (1855).
Exoprosopa collaris, Brunetti, Rec. Ind. Mus. ii, p. 444 (1909).

♂ *Head* with frons distinctly narrower at vertex than above antennæ, where it equals one-third the width of the head; dark nut-brown, with a slight pink or orange tint, covered with short black pubescence, and a few minute elongate pale brownish-yellow scales or scale-like hairs on lower part; face of similar colour to frons, with black pubescence and similar scales; proboscis dark, withdrawn; antennal 1st and 2nd joints ferruginous, 3rd black; occiput yellowish brown, with minute black bristles, which continue over the vertex nearly to the ocelli; and with whitish scales forming a band of irregular width contiguous to the eye-margins. *Thorax* black, with sparse black pubescence, covered with very short depressed yellowish (almost pinkish) brown scale-like hairs; anterior margin with a thick fringe of very long narrow brownish-yellow (varying to bright ferruginous) hair-like scales; a bunch of similar scales below the humeri, on prothorax, and below posterior corners of dorsum; coarse hairs of similar colour cover the mesopleuræ, with some black hairs intermixed below wing base; sides of thorax dull orange-brown; humeral calli reddish brown, with numerous black bristles; posterior calli reddish brown, covered with pubescence like that of the thorax, with several long strong spines projected hindwards. Scutellum uniformly dark reddish brown, with similar pubescence to the thoracic dorsum; hind margin with a row of spines. *Abdomen* black, the sides often more or less reddish; posterior margin of 1st segment narrowly, 2nd and 3rd segments from base to tip (covering one-third of the surface on each side) dull but distinct reddish brown; the whole dorsum with short depressed black pubescence; a fan-like bunch of rather dirty white very elongate scales at sides of 1st segment; a patch of long yellowish-white scales towards each side of 3rd segment, contiguous to the margin, and 6th segment (and possibly 7th also) covered with similar scales; the sides of the abdomen from 2nd segment to tip with coarse black bristly hair. Venter moderately dark brown, barely tinged with yellowish, but with paler hind margins to the segments and a few soft yellowish hairs; genitalia rather large, ferruginous. *Legs* reddish brown, metatarsi more or less darker, rest of tarsi black; fore legs, apart from the usual minute pubescence, with rows of very short bristles on tibiæ; middle femora with at least two rather strong bristles of unequal length on inner side towards tip; hind femora with a row of stronger bristles below, posterior tibiæ with the usual rows of small bristles; tarsi with short stiff black pubescence below. *Wings* best described as pale grey with the basal third dark brown, filling the anal and axillary cells except their tips, the colour continued along the costa nearly to the tip of the 1st longitudinal

vein and extending hindwards to the upper side of the discal cell, thence spreading out and embracing the apical third of that cell, the base of the 2nd posterior, and just entering the 3rd posterior, the colour sharply delimited distally by a line drawn from its costal limit to where it ends posteriorly in the 3rd posterior cell; a small clear spot at upper corner of 2nd basal cell, with a small yellowish spot immediately above it, and a slight pale yellowish tinge about the middle of the 1st posterior cell; the brown colour is only very slightly variable in its extent. Alulæ and alar squamæ with a fringe of dirty brown scales; halteres black.

Length, 14–16 mm.

Redescribed mainly from a ♂ in good condition in the Indian Museum from Bara Banki, United Provinces, 14. x. 1910, and others in less good condition from Kangra Valley or Sikkim (*Dudgeon*); Allahabad, i. 1910 (*Chatterjee*); Bandhara, Cent. Prov., India, 1. xii. 1912 (*Imms*); Sahibganj, Bengal; Bellary, South India, 10. viii.–11. ix. 1913; Surat, Bombay, 11. xi. 1911 (*Fletcher*); Bangalore; Trivandrum; Mahagany, Ceylon, 15. ii. 1891; Nilavelli, Ceylon, 30. v. 1891 (*Col. Yerbury*).

Types in Fabricius's, Westermann's and Wiedemann's collections.

It must be remembered that the foregoing description is chiefly from an individual specimen. Wiedemann noted the close affinity between *collaris* and *lar*, claiming for the former the more fox-red collar, the absence of white tomentum at the tip of the abdomen, the absence of white pubescence towards the sides at the base of the abdomen, the wholly black ground-colour of the body, the black-haired abdomen, and the shortening of the second transverse black band (so to speak) on the wing, so that it does not reach the hind border.

Most of these characters are more or less variable, especially the distance to which the more distal of the two extensions of the costal dark border reaches, and the reddish-brown colour of the sides of the abdomen. Saunders's figure of his *rugicollis* shows the limits of variation in three characters, the ferruginous collar, the shortened wing-band, and the all-black abdomen. Wiedemann's characters of the absence of white vestiture at the base and tip of the abdomen are negative ones, and it may reasonably be supposed that his specimen was somewhat worn.*

Two specimens in the British Museum from Mahagany, Ceylon (*Col. Yerbury*), appear to represent an undescribed species allied to *E. lar*, but are not in sufficiently good condition to describe properly.

One of the specimens bears a label: "? *E. binotata*, Macq." This latter I concluded † to be synonymous with *collaris*, Wied.,‡ being further convinced by a specimen of the latter in the Indian

* As the first few examples of this species seen by me answered fully to Wiedemann's *collaris*, a certain number of specimens were identified by me as such and returned to correspondents. These should bear the name of *lar*.

† Rec. Ind. Mus. ii, p. 444.

‡ *E. collaris*, Wied., is now regarded by me as synonymous with *lar*, F.

Museum, labelled "*E. bimaculata*, Macq." in Bigot's handwriting. Bigot evidently wrote *bimaculata* in mistake for *binotata*, but the two specimens described above are certainly distinct from *lar*. In the event of *binotata*, Macq., being a good species, they may be representatives of it.

146. Exoprosopa pennipes, *Wied.*

Anthrax pennipes, Wiedemann, Dipt. Exot. i, p. 129 (1821); id., Auss. Zweifl. i, p. 272 (1828).
Exoprosopa pennipes, Macquart, Dipt. Exot. ii, 1, p. 49 (1840); Brunetti, Rec. Ind. Mus. ii. p. 443 (1909).
Hyperalonia pennipes, Rondani, Ann. Mus. Gen. vii, p. 452 (1875).

Head with frons more than twice as wide above antennæ (where it equals one-third the width of the head) as at vertex, blackish, with black hairs on upper part, and below with black hairs mixed with a number of short silvery scales of rather greater width; face black, with black bristly hairs and small silver scales; proboscis yellowish brown; antennæ black, possibly sometimes reddish brown at base; occiput black, with small silvery scales at least near the eye-margins, probably a considerable part of the surface thus covered in perfect specimens. *Thorax* black; dorsum with a dark indigo-blue tinge, caused by the whole surface being covered in perfect specimens with brilliant small subquadrate blue scales, longitudinally striated, black pubescent; anterior margin with long narrow black scales; bunches of similar scales or bristly hairs below shoulders, on mesopleuræ and metapleuræ, and below hind corners of dorsum; apparently some black bristly or coarse hairs around the wing-base. Scutellum black, covered with scales like those of the thorax, pubescent, dull dark brown towards hind margin, which bears a row of spines. *Abdomen* black, covered with blue-green or green scales, with black pubescence; some long, thin, very dark brown scales in a bunch at sides of 1st segment; venter dark blackish indigo, with a little black pubescence and no trace of scales. *Legs* black; fore tibiæ and metatarsi yellowish brown; middle tibiæ very dark brown; hind femora towards tips and hind tibiæ from base to tip with rows of dense long dark brown narrow scales. (No distinct bristles are visible on the legs, but this may be due to the bad preservation of the specimens.) *Wings* deep brown, violet-tinged, fore border about the middle a little yellowish, also just a little paler about the cross-veins; tip of wing quite clear, limited by tip of 2nd longitudinal vein, and hindwards on the wing-border by the proximal side of the 2nd posterior cell.* Alulæ and alar squamæ fringed with long narrow dark brown scales; halteres blackish brown.

Length, 11–18 mm.

* In the second specimen (from Karachi) the wing is pale along the hind margin of the 3rd posterior cell.

Redescribed mainly from a specimen (? ♂) from Kohima, Assam, in the Indian Museum; a second specimen from Karachi and other specimens from Pusa; and lower ranges, N. Khasi Hills, 1878 (*Chennell*).

The Karachi specimen shows the following differences:—The 1st antennal joint (the only one remaining) is distinctly reddish brown, there is a bunch of dirty white scales at the sides of the 1st abdominal segment; the abdomen is longer, narrower, and more pointed, the last segment distinctly reddish brown, with the ovipositor protruding considerably, and the venter has indisputable traces of a median row of white scales. The only remaining leg is a hind one, on which the scales are identical with those of the Kohima specimen.

147. **Exoprosopa latipennis**, *Brun.*

Exoprosopa latipennis, Brunetti, Rec. Ind. Mus. ii, p. 464 (1909).

♂ *Head* with frons barely one-third width of head at level of antennæ, two-thirds of this width at vertex; dark olive-brown, rather velvety, with a few scattered hairs; lower part and face with small elongate pinkish-yellow scales; ocelli on a minute protuberance on vertex; antennæ blackish brown; underside of head blackish brown; mouth-border narrowly yellowish. *Thorax* black, with thick bright orange hairs on lateral margins; black bristly hairs on lower part in front; anterior margin and below both shoulders and posterior calli with thick bunches of elongate orange scales; scutellum black, with a row of black hairs or fine bristles on hind margin. *Abdomen* black, elongated, sides parallel, tip rounded, with sparse black pubescence; sides of 2nd, 3rd, and 4th segments narrowly brick-red; a bunch of pale yellowish elongate scales at sides of 1st segment; sides of abdomen with rather thick yellow hairs, which become thinner and paler towards tip; venter black, with black hairs, central segments paler in middle. *Legs* dark brown; hind femora with a row of long bristles below. *Wings* uniformly rich dark brown, unusually wide across the middle.

Length, 18 mm.

The present description is from the type, from Shillong, in the Indian Museum (which is a ♂, not a ♀), and two ♂♂ in the British Museum (Khasi Hills and Cherrapunji, Assam).

148. **Exoprosopa lateralis**, *Brun.* (Pl. III, fig. 7.)

Exoprosopa lateralis, Brunetti, Rec. Ind. Mus. ii, p. 467, pl. xii, fig. 17 (1909).

♀ *Head* with frons and face dark olive-brown, becoming more or less orange towards the lower part of the latter, both covered with black pubescence and (except the upper part of the frons) with small pinkish-yellow scales; proboscis dark brown, palpi

yellow; antennæ brown, 1st and 2nd joints bristly; occiput dark grey, with yellowish scales around eye-margins. *Thorax* black, with long bright ferruginous scales or bristly hairs on anterior margin, below shoulders, and on posterior calli; dorsum (denuded) evidently more or less covered with very short yellow scale-like hairs closely applied, which towards the sides and hind margin are thinner and longer; lower part of thorax bare, with ferruginous marks.* *Abdomen* elliptical; black, the sides more or less broadly brick-red; this coloration is very variable in quantity, as in one specimen it only moderately narrowly borders the abdomen, and in another one it extends so far inwards as to reduce the black part almost to a dorsal row of spots. Bunches of ferruginous elongate scales at each side of 1st and 2nd segments, and a small tuft of stiff black hairs at the sides of each segment; dorsum thinly covered with short tawny yellow scales and black hairs; last segment reddish, black at the middle of the base; venter brownish brick-red, with sparse yellow hair-like scales. *Legs* (mainly missing) tawny brown: fore coxæ with rather long yellow hairs; hind femora and tibiæ with short black spines. *Wings* dark brown, tip and posterior border nearly to the base irregularly and indistinctly clear, the clear part extending into the discal cell; traces of a small round clear spot in upper corner of 2nd basal cell; alulæ and alar squamæ with dirty brown elongate scales.

Length, 14–18 mm.

Described from three ♀ ♀ in the Indian Museum from Calcutta; and Talewaddi, N. Kanara Distr., 3–10. x. 1916 (*Kemp*).

149. **Exoprosopa annandalei**, *Brun.* (Pl. III, fig. 8.)

Exoprosopa annandalei, Brunetti, Rec. Ind. Mus. ii, p. 469, pl. xii, fig. 20 (1909).

♀ *Head* with vertex, frons, and face blackish, with short sparse yellowish hairs, and some stiff bristly black hairs on frons, which is considerably narrowed on the vertex, where the ocellar triangle is very small; mouth-opening yellowish, proboscis dark brown; palpi black, short, filamentous, with a single row of hairs; antennæ yellowish, first joint hairy, third rather elongated, with moderately long style; back of head dark grey; eyes dark brown, with some yellowish hairs, which are whitish behind the eyes. *Thorax* blackish; tawny-yellow hairs rather thickly placed on fore border, and on the sides, where there is a pale tawny spot on the pleuræ; dorsum nearly bare (? denuded). Scutellum light brown, posterior border with a row of black spiny bristles and short sparse yellowish hairs; metanotum hidden. *Abdomen* ovate, chestnut-brown (ground-colour), with a row of irregularly oval dorsal black spots at the base of each segment, and with traces of a narrow black line almost on the posterior borders of some of the segments; a sparse band (interrupted in the middle) of short

* Possibly due to discoloration.

whitish hairs on the anterior part, and a similar band of blackish hairs on the posterior part, of each segment; the second segment possessing a basal row of short sparse tawny hairs and a bunch of longer white hairs on each side at the base; the short whitish hairs on the dorsum may possibly extend over the greater part of the surface, and appear more like scales than hairs. Venter chestnut-brown, with irregular black marks and with short white scaly hairs generally distributed over it. *Legs* tawny brown, fore coxæ similar, posterior coxæ blackish brown; hind femora with a few hairs below, posterior tibiæ moderately covered with short bristles; tarsi blackish brown, minutely pubescent below. *Wings* pale grey, with a dark brown oblique baso-costal band, which has an indentation on the lower side; the brown colour extends along the costa to the tip of the first longitudinal vein, its outer edge extending posteriorly to just behind the second posterior cell, the colour thus filling slightly more than half the first longitudinal and discal cells, and extending in an irregularly straight line from the latter cell to the base of the wing, filling half the anal cell; round brown spots, all of equal size, are placed at the tip of the second longitudinal vein, at the base of the fork of the third longitudinal and at the tip of the veinlets dividing the second, third, and fourth posterior cells; on the upper corner (adjoining the base of the discal cell) of the lower basal cell a small bluish opalescent spot; at extreme base of wings and along the stronger veins a distinct tawny colour; halteres yellowish white.

Length, 9–12 mm.

Described from the two original females in the Indian Museum from Moulmein, Lower Burma, 6. iii. 1908 (*Annandale*).

150. **Exoprosopa maculiventris**, sp. nov.

♂ *Head* wholly blackish grey; frons about half as wide again at level of antennæ as at vertex, with fine black hairs, intermixed with short yellow ones on lower part; face with sparse short yellow hairs and on lower part with rather short black hairs; antennæ and mouth-parts black; the considerably puffed-out occiput with a few short yellow hairs, and on hind border a narrow fringe of them. *Thorax* and *scutellum* black, with moderately short black pubescence, which is longest on the scutellum; anterior border narrowly with short yellow hairs, and a conspicuous bunch of long bright yellow pubescence below each shoulder; some yellow hairs along the sides below the wings and a large bunch below the posterior angles of the dorsum; the posterior calli themselves having a few much shorter and paler yellow hairs on the hinder side. *Abdomen* black, surface of segments (except 1st) mainly covered with small closely-set black scales, and bearing long fine black hairs, except at base and hind margins; 1st segment dark blackish grey, unscaled, with short yellow hairs on dorsum and a bunch of long bright yellow hairs

towards and over each side; on the 2nd segment towards each anterior corner is a circular spot of yellowish-white scales; this pair of spots is duplicated on the 3rd and 4th segments, the scales forming them being less yellow on the 3rd segment and nearly white on the 4th; 5th segment bearing no white spots, but 6th and 7th each with a similar pair of white scale-spots; sides of 2nd segment with long yellow hairs anteriorly (as in 1st segment) and black hairs posteriorly; sides of remaining segments with thick black pubescence. Venter black, with small closely impressed black scales and thin black pubescence; sexual organs too concealed for observation. *Legs* wholly black, with ordinary pubescence; tibiæ with obvious closely impressed small black scales and two distinct rows of bristles on hind pair, with numerous others more or less arranged in longitudinal rows; hind femora with a little soft black hair and a row of distinct, fairly long bristles on underside. *Wings* with about anterior half deep blackish brown, the colour filling the marginal cell except the tip, thence running parallel to the hind margin of the wing, filling half the 1st posterior cell; thence retreating, filling barely half the discal cell; thence extending to the hind angle of the wing, filling half the anal and axillary cells. An oval spot at tip of 2nd vein, joining the costa and also the extremity of the costal darkening; a spot at fork of 3rd vein, another over the cross-vein joining the 2nd vein, and another over the posterior cross-vein; all the spots concolorous and contiguous to the main expanse of colour. Alar squamæ black, with short fringe of bright yellow hair; halteres black.

Length, 14 mm.; expanse, 34 mm.

Described from a single perfect specimen in the Indian Museum from Kousanie, Garhwal State, 6075 ft., 22. vii. 1914 (*Col. Tytler*).

The wing-markings are very nearly similar to those of *E. annandalei*, figured in Rec. Ind. Mus. ii, pl. xii, fig. 20, except that in this latter species the colour is of a much lighter brown.

151. Exoprosopa stylata, sp. nov.

♂ *Head* with frons at vertex about two-thirds as wide as at level of antennæ, where it is less than one-third the width of the head; covered with dull brownish tomentun or dust with a tinge of yellow, sparsely beset with stiff black hairs; lower part of frons with depressed black scales, which in certain lights exhibit a silvery lustre; face distinctly produced into a blunt cone, covered thickly with similar black scales (shining silvery) and long bristly hairs as on frons; upper edge of mouth-opening furnished with very long, thin, dark brown scales; mouth-opening and proboscis brown, latter extending forward as far as tip of antennæ. Antennæ black, 3rd joint elongate conical, as long as 1st and 2nd together, with a style as long as the joint itself, bearing a pale elongate thick bristle at tip. *Thorax* black, faintly shining; at least hinder part with small impressed black scales (which possibly cover the entire

surface); dorsum also with stiff black pubescence of moderate length; anterior margin with a thick fringe of very elongate bright yellow scales projecting forwards, forming a sort of dense collar; shoulders entirely covered with a dense bunch of very elongate black scales, which extend (diminishing in strength) over the mesopleura, and continue as short stiff hairs over part of the sternopleura; pteropleura bare, shining, but the metapleura with a thick bunch of black scales on its posterior part; sternopleura with a slight greyish tinge on lower part. Scutellum black, with minute adpressed black scales covering its entire surface, and a row of curved black bristles on hind margin. *Abdomen* black, faintly shining, entirely covered with minute adpressed black scales, which, if viewed at a low angle from in front, show a silvery sheen; and with a row of black bristles on hind margins of at least the last two or three segments, the hind margins of which bear a row of rather short but obvious dark brown scales; the outer two-thirds of 1st segment with a dense covering of very elongate, bright chrome-yellow scales, the actual sides with elongate black scales; sides of other segments also with elongate very narrow dark brown scales, and a few other quite broad dark brown ones, intermixed posteriorly with black bristly hairs; six spots composed of scales, which, viewed from in front, appear silvery, and from behind dull milk-white, are placed as follows: one towards each side of the dorsum on 3rd segment, one at base in centre of 4th, one towards each side of 6th, and an elongate one at base of 7th extending over the greater part of the segment. Venter covered uniformly with minute brownish-black scales that appear silvery when viewed at a low angle either from in front or behind; a row of bristles on hind margin of each segment. Genitalia rather large, apparently consisting of a small sub-globular reddish-piece and a greyish cone-shaped piece of larger size, pubescent. *Legs* black, coxæ with bristly hairs; femora closely covered with black scales that appear silvery in certain lights; tibiæ apparently reddish brown, but in certain lights the scales shine silvery; tarsi brown. *Wings* pale grey, iridescent; a brown baso-costal band, limited distally by tip of 1st longitudinal vein, the hinder margin of the band nearly a straight line thence, through the anterior cross-vein and extreme base of 4th posterior cell, and thence to base of wing, encroaching narrowly on anal cell; discal cell nearly clear, a darker brown spot jointly over tip of præfurca and anterior cross-vein; another over base of discal cell and forking of 5th vein, a small one at base of 3rd posterior cell.

Length, 8 mm.

Described from a unique specimen from Hadagalla, Ceylon (*T. Bainbrigge Fletcher*).

Type in the British Museum, presented by Mr. Fletcher.

The conspicuous silvery-white spots on the abdomen placed like the "5" of a playing card, in addition to the exceptionally long antennal style, render this species easily recognisable.

152. Exoprosopa insulata, *Walk.* (Pl. III, fig. 4.)

Anthrax (s. g. *Litorhynchus*) *insulata,* Walker, Ins. Saund., Dipt. pt. iii, p. 172 (1852).

Exoprosopa insulata, Brunetti, Rec. Ind. Mus. ii, p. 446 (1909).

Head with frons about half as wide again above antennæ, where it forms one-third the width of the head, as at vertex; dull olive-brown (in well-preserved specimens, otherwise blackish), with black pubescence and minute elongate pinkish-yellow scales or scale-like hairs; face concolorous, but yellowish about the mouth-opening, with similar hairs and small scales; proboscis black, projecting some distance beyond tip of antennæ; antennæ black; occiput dark grey, with very small yellow scales in the neighbourhood of the eye-margins, hinder edge with a fringe of short yellow hairs. *Thorax* dark olive-grey or olive-brown (in perfect specimens), with short black pubescence and very minute elongate yellow scales, which perhaps are sparser about the centre of the dorsum; anterior margin with long brownish-yellow scales, which are also fairly abundant from below the shoulders to below the wing-base, and, again, below the posterior corners of the dorsum. Lower part of prothorax, the mesopleuræ, pteropleuræ, and sternopleuræ with long black bristly hairs; scutellum concolorous with thoracic dorsum, with small yellow scales and a few black hairs, and a row of rather sinuous thin black hairs on posterior margin. *Abdomen* rather dull black, slightly shining; 1st segment with a bunch towards each side of comparatively short, very erect, elongate, brownish-yellow scales, and a narrow band of such erect scales extends across the segment on the anterior half; 2nd segment with broad band on anterior half of small elongate closely-applied yellow scales, the posterior half being covered with black scales of similar nature; 4th and following segments with similar black scales on anterior part and yellow scales on hinder part; 4th segment with a patch of silvery-white scales towards each side, and 7th segment mainly covered with such scales; sides of abdomen with long brown scales and long black hairs; venter black, with a little black pubescence and covered with minute yellow scales. *Legs* black; tibiæ more or less dark brown; femora with small closely-applied pale scales, posterior femora and tibiæ with the usual bristles. *Wings* pale grey, with a broad oblique dark brown or blackish-brown band extending on the costa to tip of 1st longitudinal vein, and distinctly beyond bifurcation of 2nd and 3rd veins, and anterior cross-vein, embracing basal third of discal cell and crossing anal and axillary cells about their middles; several blackish spots are present, variable in number and size, four on the clear part of the wing being always present, placed respectively (1) near tip of 2nd vein, (2) at fork of 3rd vein, (3) on 2nd vein at the junction of the veinlet joining this vein to the 3rd, and (4) over outer side of discal cell, generally elongate and sometimes reduced to two separate spots; on the brown part of the wing, the spots being much darker in colour, there are generally one over the anterior cross-vein, one at the fork of the

4th vein, and at the base of both the 3rd and 4th posterior cells; adventitious spots freely occur about the tips of the 2nd and 3rd longitudinal veins, and occasionally in other parts, and the 3rd posterior cell is often more or less bisected longitudinally by an additional incomplete veinlet. The 1st posterior cell is not infrequently closed just before the border. Halteres black.

Length, 7–10 mm.

Redescribed from several specimens, mostly in inferior condition, in the Indian Museum from Soondrijal, Chitlong, Nagorkote, Pharping, and Khumdhik, iii. 1909—all in Nepal; Dehra Dun, xi. 1907 [*Lt.-Col. Wyville Thomson*]; Naini Tal District, 4. iv. 1910; Mussoorie, ix. 1906; Simla, x. 1911; Allahabad, v. 1911 and xii. 1910 (*Chatterjee*); Bandhara, Central Provinces, 1. xii. 1912 (*Imms*); Mahagany, Ceylon, 17. i. 1912 (*Col. Yerbury*); Castle Rock, N. Kanara District, 11–26. x. 1916 (*Kemp*); Madhupur, Bengal, 16. x. 1909 (*Paiva*); Pipera, Gondo District, United Provinces, 9. iii. 1909; Ootacamund, S. India, 24–31. xii. 1913 (*Fletcher*); lower ranges, N. Khasi Hills, 1878 (*Chennell*).

There seems no reasonable doubt of this being Walker's *insulata*, described originally from the "East Indies." It is common through Nepal and extends to the Indian plains. Walker says the sides of the abdomen are fringed alternately with black and yellow hairs, but this does not appear to be the case, though possibly in perfect specimens the white scales on the 4th and 7th segments may overhang the margin sufficiently to produce this effect. His description also of the wing-spots does not quite agree with mine, but these markings are admittedly variable.

A specimen in the Indian Museum from Dehra Dun labelled "*E. 8-notata*, Big., sp. nov." is certainly identical, and is apparently merely a MS. name; a second specimen with precisely similar markings is from Calcutta.

A further specimen from "Thingaunyinaung to Myawadi," Lower Burma, 900 ft., 24–26. xi. 1911 (*Gravely*), has the spots in the clear part of the wing all so enlarged and blurred that hardly any grey surface remains.

Some notes of mine on the variation of the wing-markings appeared recently (Rec. Ind. Mus. ii, p. 446).

In comparing the descriptions of *insulata*, Walk., *bengalensis*, Macq., and *brahma*, Sch., it will be seen that they are somewhat similar. The latter I have not seen, but a number of specimens of both *insulata* and *bengalensis* in the Indian Museum (both identified by me, but, I think, without possibility of doubt) prove that at least these two are quite good and distinct species. *E. insulata* is known by the black or deep blackish-brown colour of the basocostal band, which, though not actually clearly defined, stands out if a number of specimens be glanced at collectively; whereas in *bengalensis* the colour is brown, without any trace of black, and there is no apparent line of demarcation between the anterior half and the posterior half, the latter being only a little lighter.

The spots in *insulata* stand out distinctly, especially those nearest the wing-border; they are black or blackish brown, and some of them are placed elsewhere than on the cross-veins. The "spots" in *bengalensis* are small, moderately light brown infuscations, and occur only on the cross-veins, although the veins themselves are often lightly infuscated for considerable distances. *E. brahma* has distinct spots, apart from infuscations of cross-veins, and should therefore in this character approximate to *insulata*, but Schiner distinctly describes the anterior part of the wing as only smoke-brown. Again, in *brahma* the scutellum and antennæ are reddish yellow or brownish, whereas in both *insulata* and *bengalensis* these parts are black. The presumption is that all three are good species.

153. **Exoprosopa puerula**, sp. nov. (Pl. III, fig. 9.)

Head with frons distinctly broader at level of antennæ, where it is one-third the width of the head, than at vertex; both frons and face blackish, former more or less cinereous grey towards vertex, latter orange yellowish around the mouth; the lower half, or rather more, of the frons and the major part of the face covered with closely-applied yellowish scales and a little fine black pubescence; some yellow hairs about the lower part of the face; proboscis blackish; antennæ blackish grey; occiput blackish, with a considerable amount of dirty white scales, closely applied. *Thorax* blackish, thickly covered with very thin yellowish hair-like scales; anterior border with a fringe of long brownish-yellow scales; some long bristly black hairs on lower part of prothorax; pleuræ with bristly scale-like brownish-yellow hairs; scutellum black, about the apical half reddish brown, the whole dorsum (apparently) covered with short yellowish scales like those of the thorax. Bristles of thorax normal. *Abdomen* blackish, dull; hind border of segments rather narrowly brownish yellow, the colour spreading out considerably towards sides of 2nd and 3rd segments; the whole dorsum covered with black hairs and closely-applied small brownish-yellow scales, which towards sides of 3rd segment are whitish; a bunch of elongate pale brownish-yellow scales at sides of 2nd segment and a similar bunch of shorter small black scales at sides of 3rd segment. Venter yellowish, marked here and there with black, and mainly covered with small yellow scales. *Legs* black; femora and tibiæ with yellowish scales and the usual bristly hairs; tarsi black. *Wings* clear, the dark oblique band running diagonally from tip of auxiliary vein, crossing the centres of the anal and axillary cells; a loop extending from the middle of the 1st posterior cell, along the outer side of the discal cell; the colour also encroaches well into the base of the 4th posterior cell; a pale yellowish spot around the anterior cross-vein and base of 4th posterior cell, a semi-hyaline small spot about the base of the discal cell; halteres brown; clubs dull yellow.

Length, $4\frac{1}{2}$–6 mm.

Described from two specimens in the Indian Museum from Madras (*Capt. Cragg*).

154. **Exoprosopa bengalensis**, *Macq.* (Pl. III, fig. 5.)

Exoprosopa bengalensis, Macquart, Dipt. Exot. ii, p. 49, pl. xviii, fig. 4 (1840); Brunetti, Rec. Ind. Mus. ii, p. 445 (1909).

♂ ♀ *Head* with frons at vertex half as wide as at level of antennæ, where it is barely one-third the width of the head; dull olive-brown or cinereous, the amount of yellowish tinge variable; whole frons and face with black pubescence in moderate amount, also (except towards vertex of former) covered with short narrow yellowish scales, closely applied to the surface; mouth-border brownish yellow, with black hairs; proboscis blackish brown, labella narrow; palpi black, thin, with fine black hairs; antennal 1st and 2nd joints brownish yellow, with black bristles, 3rd joint black; occiput blackish, with yellowish scales around eye-margins. *Thorax* brownish grey, dorsum covered with short coarse yellowish scale-like hairs; anterior margin with elongate orange-yellow scales, thickly placed, and bunches of similar or slightly paler scales below the shoulders, on the mesopleuræ, and around and behind the wings; black spines on humeral and posterior calli; scutellum blackish, hind margin more or less reddish brown, covered with short yellowish hairs and with a row of black bristles on posterior margin. *Abdomen* blackish (?) or reddish brown, wholly covered with very small elongate yellowish scales and black bristly hairs; a bunch of elongate yellowish scales at sides of 1st segment; venter blackish or reddish brown, with a few long yellow hairs; hind margins of segments more or less pale, with some yellowish scales. *Legs* blackish; femora and tibiæ with rather thickly-placed, closely-applied, yellow scales, which extend over the upper side of the metatarsi, and apparently occasionally to the remaining joint also; the whole of the legs with black bristles, the tarsi with black pubescence. *Wings* yellowish grey; a slight infuscation over practically all those parts of the veins that lie transversely; the veins themselves more or less darkened basally; halteres yellowish, knobs a little darker; alulæ and alar squamæ with a dirty brown and yellowish fringe of scales respectively.

Length, 10–12 mm.

Described from several examples in bad condition in the Indian Museum, labelled "? India"; Hadagalla, Ceylon, ix, x. 1911; Trincomali, 14. i. 1891, and Mahagany, Ceylon, 15. ii. 1891 (*Col. Yerbury*).

The genitalia are quite hidden; the sex of the specimens is therefore uncertain, and no difference in the width of the frons in any of them is apparent.

Type in the Paris Museum.

155. **Exoprosopa brahma**, *Sch.* (Pl. III, fig. 6.)

Exoprosopa brahma, Schiner, Reise 'Novara,' Dipt. p. 199 (1868).

"Brown; venter and scutellum reddish yellow, latter at base blackish. Whole ground-colour of body can be seen to be pale

brown through the dense pale pubescence. Thorax in front and at sides with longer golden-yellow hairs; in front of and around wing-base with black bristles. Abdomen at the base with thick and long golden-yellow hair; 2nd segment on fore border with a whitish-yellow cross-band. Head reddish brown, epistome paler, frons darker; pubescence short, bright golden yellow; frons black on hinder part. Antennæ brown, 3rd joint very elongate, gradually tapering and produced into the style. Legs reddish yellow, knees rather darker; tarsi brown; femora with shining scales; all bristles black; pulvilli rudimentary. Wings sooty brown, darker on front margin and more reddish, with eight black spots: two at base of outer marginal (cubital) cell, two at base of 2nd posterior cell, one each at bases of 3rd and 4th posterior cells, one on outer side of discal cell, and the last one suffusing the anterior cross-vein. Cross-vein joining upper branch of cubital vein to subcostal vein, with a recurrent appendix; only three submarginal cells. Length 4 lines. Two specimens; Ceylon."

The above is Schiner's description; he compares it with *E. alexon*, Walk., and *punctulata*, Macq.

Type presumably in the Vienna Museum.

156. **Exoprosopa niveiventris,** *Brun.*

Exoprosopa niveiventris, Brun. Rec. Ind. Mus. iii, p. 214 (1909).

♀ *Head*: frons at widest (level of antennæ) one-third the width of the head, narrowing at vertex to half this width; dark brown, covered with close, light brownish-orange scales, which become lighter coloured below the antennæ; the whole frons covered with short black hairs; ocelli small, black, close together, placed on a small tubercle; mouth-border yellow, proboscis dark brown. Antennæ black; 1st and 2nd joints thickly beset above and at the sides with strong black bristles; 3rd joint rather long, absolutely bare, with a very distinct style, which itself bears a microscopic but distinct apical joint. From the base of the antennæ obliquely to the edge of the eye there is on each side of the frons a narrow groove, quite destitute of scales or pubescence. Back of head broad behind the eye, with minute black pubescence, and covered towards the sides with soft yellowish-white scales, which may perhaps extend over nearly all the back of the head in some specimens; a fringe of short, bright orange-yellow hairs encircles the back part of the head, meeting the dense pubescence of the thorax. *Thorax* dull black, with some short black hairs towards anterior border, and in front of the scutellum; front part of thorax (not extending to the dorsum proper) covered densely with narrow, elongate, bright yellow scales, which also extend to the sides of the thorax, and form fan-shaped bunches below each shoulder and behind each wing; these scales become almost thick pubescence at the sides of the dorsum, being especially thick above each wing. The true dorsum

is very sparsely covered with very short yellowish scales, which probably even in perfect specimens never wholly cover the surface; scales at sides of thorax more yellow than orange. Posterior calli prominent, ferruginous, covered with irregular small black bristles, with some long yellowish-white scaly pubescence on the outer side, and there are four powerful long black spines placed close together and directed horizontally backwards. Scutellum ferruginous brown, with an irregular double row of black spines on posterior margin, and short yellow scales round the dorsum, which is quite bare in the middle, both of scales and hairs. *Abdomen* black, covered with microscopic black scales; thick, scaly, whitish pubescence at the sides of the 1st segment; at the base of the 2nd segment (which is the widest) a wide band of scaly yellowish-white pubescence; the remaining segments also bear similar bands at their bases of more whitish scaly pubescence, this being shortest on the 5th segment; on the posterior borders of the 1st, 6th, and 7th segments a row of rather strong black bristles, directed backwards. Genital organ distinct, black, encircled towards the posterior part and at the sides by a rather thick fringe of orange hairs; the tip itself more greyish, and bearing two vertical rows (containing seven in each) of rather long, roseate scales, like the teeth of a comb. Venter black, nearly covered, except towards the tip, with close, nearly snow-white, scaly pubescence, the tip with black bristles. *Legs* black; coxæ with yellowish-white scales and distinct black bristles; femora with similar scales and short black hairs, the middle pair with two rows of short, distinct spines on underside; the hind pair with a similar row; fore tibiæ bare, middle tibiæ beset somewhat irregularly with four rows (one on each side) of conspicuous but moderately short bristles; hind tibiæ closely beset with elongate dirty white scales, lying close to the surface, and intermixed with strong, moderately short, black bristles, and with an irregular circlet of black spines at tip, most of them on the underside; tarsi minutely but closely pubescent, with a row of minute spines below, being longest on hind pair. *Wings* pale grey, costal cell and the basal parts of all the veins ferruginous brown; costal vein apparently bare, but viewed microscopically, it presents a very closely-placed row of minute black spines, which are conspicuous on the extreme base of the costa, where they are larger and are intermixed with close-lying, dark greyish scales; at the extreme base of the costa is a very powerful, thick, black, curved spine. Tegulæ bright orange, with a fringe of elongated scales, which are black on outer part of the edge and dirty white towards the base; alula of wing grey, with a fringe on posterior border of grey scales, which continue for a short distance along the posterior margin of the wing; halteres with stem brownish, club very pale creamy orange.

Length, 18–20 mm.

Described from two ♀♀ in the Indian Museum, taken by Dr. Annandale at the base of Paresnath Hill, West Bengal,

16. iv. 1909 (1000 ft.); South Coorg, S. India, 15–26. v. 1914 (*Fletcher*); Trincomali, 15. ix. 1890; and Mahagany, Ceylon, 8. ii. 1891 (*Col. Yerbury*).

A conspicuous species, resembling a *Hyperalonia* of my fourth group (Rec. Ind. Mus. ii, p. 443).

A single ♂ was taken by Dr. Annandale in company with *niveiventris* ♀, of which species I conclude it to be the ♂ The frons is barely appreciably narrower, therefore the narrowness of the back of the head above, the difference in shape of the genital organs, and the nearly clear wings are the only points in which it materially differs from the previously described species.

Head almost exactly as in *niveiventris*, except that the first joint of the antennæ is pale, and the back part of the head is less puffed out behind the eyes, where it is covered closely with very small creamy-orange scales; mouth-border whitish, bare. *Thorax* dusky olive-brown, with two faint but distinct, narrow, widely separated, blackish lines; anterior part and sides with pubescence as in *niveiventris*, except that it is whitish below the posterior calli; scutellum as in *niveiventris*. *Abdomen* as in *niveiventris*. The genital organ is concealed within the body, but is covered with whitish shimmer and fine black bristles, its tip apparently consisting of a pair of rather complex orange-coloured claspers, the upper side of the tip being covered with thick, black, bristly spines. *Legs* with the underside of the fore femora pale and the spines below the hind tarsi less conspicuous. *Wings* wholly very pale grey, including costal cell; the veins in the middle at the base of the wings are pale orange, as are also the subcostal, third and fifth longitudinals; halteres cream-coloured.

Length, 16 mm.

157. **Exoprosopa vitripennis**, *Brun.*

Exoprosopa vitripennis, Brunetti, Rec. Ind. Mus. vii, p. 469 (1912).

♂ *Head*: frons above antennæ nearly one-third the width of the head, lessening to one-third of that width at the vertex, shining black, with short black pubescence and pale whitish-yellow scales above the antennæ and over the shining black face also; these scales show prismatic colours in certain lights; antennæ dark brownish yellow, 3rd joint ending in a fine point; oral opening whitish yellow, bare, or with a few very short pale yellow hairs; proboscis rather long, blackish; palpi black, curved, very slender, with short hairs; occiput and underside of head black, a few scales closely pressed to the surface, behind the eyes. *Thorax* shining black, with milk-white bristly hairs on the sides, anterior border of dorsum, and around the wings. Scutellum dull coffee-brown, some small white scales below its hind margin, closely applied. *Abdomen* black, moderately shining, almost bare; small milk-white scales at the bases of the segments towards the sides; venter black, with the basal part of most of the segments covered with small snow-white scales. *Legs* wholly black, except for a

slight dull brown reflection on the tibiæ in certain lights. *Wings* absolutely clear, vitreous, highly iridescent; costal, auxiliary, and 1st longitudinal veins and those at base of wings yellowish, the remainder black; halteres yellow.

Length, 10 mm.

Described from a single ♂ in the Indian Museum from Mahabaleshwar, Satara District, Bombay Presidency, 4200 ft., 13–16. iv. 1912 (*Gravely*); in the British Museum, from Trincomali, 4. iv. 1892, and Mahagany, Ceylon, 12. ii. 1891 (*Col. Yerbury*).

Very near *E. vitrea*, Big., differing by the wholly reddish-brown antennæ, the whitish hair on anterior margin of thorax, the wholly black scutellum, the wholly clear wings, and the absence of any reddish colour towards the sides of the dorsum.

158. **Exoprosopa vitrea**, *Big.*

Exoprosopa vitrea, Bigot, Ann. Soc. Ent. France, lxi, p. 344 (1892); Brunetti, Rec. Ind. Mus. vii, p. 468, pl. xxxvii, fig. 5 (1912).

♂ ♀ *Head*: frons at level of antennæ barely one-third the width of the head, narrowing to nearly one-third of that width at vertex in ♂ and to half that width in ♀, black, with black hairs, the lower half with short bright yellow scales; face with similar scales and a few short bright yellow hairs; facial bump fairly large; mouth-border pale whitish yellow; proboscis black; antennæ black, no trace of lighter colours; back of head moderately protruding, black, with an irregular narrow fringe immediately behind the eyes of very small greyish-white scales lying close to the surface; hind margin of head with a fringe of short yellow or yellowish-white hairs. *Thorax* dark blackish brown; anterior margin and shoulders with thick bright yellow scale-like hairs, which are continued around the whole of the prothorax, but in the ♂ they are quite black for a considerable space on the lower part (immediately below the mouth), whereas in the ♀ they are sometimes uniformly yellow and sometimes similar to those of the ♂; surface of dorsum covered with short depressed brownish-yellow hairs; pleuræ with yellowish-grey or grey hairs, and some around the base of the wing. *Abdomen* black, with very short depressed bright yellow hairs and black pubescence in the ♂; the sides of the 2nd, 3rd, and 4th segments are broadly and completely covered with small snow-white depressed scales, which also form an entire band across the basal half of the two latter segments; these scales are practically absent in the ♀, but a few are usually present. Venter blackish, the middle part a little paler, generally with a considerable space covered with soft short white hairs; tip inclined to be reddish. A considerable amount of white hairs in both sexes at anterior corners of abdomen. *Legs* wholly black, with the usual fine pubescence and very short black bristles. *Wings* clear, costal and subcostal cells very pale yellowish grey; halteres pale yellow.

Length, 7–13 mm.

Redescribed from a ♂ and ♀ *in cop.* from Helwak, Koyna

Valley, Satara District, Bombay Presidency, 2000 ft., 28–30. iv. 1912, and several others of both sexes from other localities in the same neighbourhood, up to 3500 ft., and from the 23rd to the 30th; Khemsa, Western Ghats, 2650 ft., 5. v. 1913.

The amount of yellow hair on the abdomen and the extent of the white scales are both variable.

159. **Exoprosopa basifascia,** *Walk.*

Anthrax basifascia, Walker, List Dipt. Brit. Mus. ii, p. 248 (1849).

"Head tawny and clothed with tawny hairs; mouth black; eyes piceous; feelers black, ferruginous at the base; chest piceous, clothed with tawny hairs, which form a fringe along the fore border and on each side; scutcheon and breast ferruginous, the latter clothed with tawny hairs; abdomen dark piceous, with a fringe of pale yellow hairs on the fore border of each segment and more completely clothed on the underside; legs black, thighs piceous; wings slightly grey, tawny at the base and on the fore borders and along the margins of the veins; wing-ribs and veins ferruginous, the latter piceous towards the tips; poisers tawny.

"Length of body 8 lines, of the wings 18 lines. North Bengal."

Type in the British Museum; unique.

The following four species are probably from India, although recorded by Walker merely from the "East Indies":—

160. **Exoprosopa alexon,** *Walk.*

Anthrax alexon, Walker, List Dipt. Brit. Mus. ii, p 246 (1849).

"Body ferruginous; head and chest piceous; head thickly covered with ferruginous down; eyes very dark red; feelers tawny; chest clothed with tawny hairs; breast with longer pale yellow hairs; scutcheon ferruginous; back of the abdomen clothed with tawny and white hairs, and along the hind borders of the segment with piceous hairs and thereby banded; underside rather paler and clothed with white hairs; legs ferruginous; thighs and shanks clothed with very short pale yellow hairs and beset with black bristles; feet piceous, clothed beneath with short black bristles; wings brown, which colour passes into brownish grey towards the hind border near the base, and the disks of some of the areolets in the middle of the wing are also grey; the brown has likewise a very oblique branch, which becomes grey and irregular as it approaches the hind border, which, like the tips of the wings, is grey, with the following exceptions: a brown spot on the 1st and sometimes another on the second of the longitudinal veins where their upward curve approaches the fore border; two brown spots on the cross-veins near the tip, one of them mostly on the brown part, from which it is distinguished by its darker colour; wing-ribs and veins ferruginous; poisers tawny.

"Length 5 lines, expanse of the wings 13 lines. East Indies.

"From Archdeacon Clerk's collection."

Type in the British Museum.

161. **Exoprosopa semilucida,** *Walk.*

Anthrax semilucida, Walker, Ins. Saund., Dipt. pt. iii, p. 170 (1852).

♀ "Black; head grey above, hoary beneath, clothed in front and beneath with tawny hairs; feelers black, dark ferruginous at the base; 1st joint short, hardly twice the length of the 2nd, 3rd slightly tapering from the base to the tip, about thrice the length of the 1st; 4th slender, linear, not more than one-fourth of the length of the 3rd; chest and breast clothed with tawny hairs; scutcheon dark ferruginous; abdomen slightly obconical, a little broader but not longer than the chest; each segment adorned with a band of pale yellow hairs; the hairs beneath are hoary and occupy a large part of each segment; wings pale grey, tawny at the base and along the fore border for full three-fourths of the length; wing-ribs tawny; veins black, tawny towards the base and along part of the fore border; poisers tawny, with paler knobs. Length of the body 8 lines, of the wings 18 lines. East Indies."

162. **Exoprosopa auriplena,** *Walk.*

Anthrax auriplena, Walker, Ins. Saund., Dipt. pt. iii, p. 171 (1852).

♀ "Black, clothed with tawny hairs; head adorned with a tawny covering, clothed with short black and tawny hairs; peristoma yellow; mouth and epistoma prominent; breast hoary, clothed with pale hairs; scutcheon ferruginous; abdomen nearly elliptical, a little longer than the chest; fore borders of the segments adorned with bands of yellow hairs; hind borders slightly ferruginous above, distinctly so beneath, which is clothed with hoary hairs; legs clothed with short black hairs, armed with black spines; shanks dark tawny towards the base; wings grey, bright tawny at the base beneath the fore border and along the borders of most of the veins, adorned with eight grey spots, which are mostly on the cross-veins; there are also two paler and indistinct grey spots towards the base; poisers tawny, with yellow knobs. Length of the body 4½ lines, of the wings 10 lines. East Indies."

163. **Exoprosopa albida,** *Walk.*

Anthrax albida, Walker, Ins. Saund., Dipt. pt. iii, p. 171 (1852).

♀ "Black, thickly clothed with pale yellow hairs; head clothed above with yellow hairs; peristoma whitish yellow; epistoma prominent; 1st joint of the feelers pale tawny; breast and underside of abdomen clothed with white hairs; scutcheon ferruginous; abdomen mostly ferruginous, slightly obconical, not longer than the chest, clothed with whitish-yellow hairs; legs tawny, armed with black spines, clothed with pale yellow hairs; feet

and hind shanks black; wings whitish, yellow at the base and along the fore border; disks of the areolets very pale grey; an irregular very oblique grey band extending from three-fourths of the fore border to one-sixth of the hind border, on approaching which it becomes very indistinct; wing-ribs tawny; veins black, tawny towards the base and along the fore border; poisers pale yellow. Length of the body 9 lines, of the wings 16 lines. East Indies."

Genus **SPOGOSTYLUM**, *Macq.*

Spogostylum, Macquart, Dipt. Exot, ii, 1, p. 63 (1840).
Spongostylum, Kertész, Cat. Dipt. v, p. 58 (1909).

GENOTYPE, *Spogostylum mystaceum*, Macq.

♀ Generic characters of *Anthrax*. Face not prominent, with rather short hairs; frons tomentose; 3rd antennal joint short, tip rounded, style of two distinct segments, cylindrical; 1st joint as long as 3rd, 2nd rather shorter, with a few hairs at tip. *Wings* three times as long as abdomen; three submarginal cells, 1st and 2nd cells with an appendix.

Range. North Africa, Asia Minor, India, Chile.

Macquart specially notes the "moustache" covering the face, the antennal style, the shortness of the abdomen, and the length of the wings. The genus is allied to *Exoprosopa* by the three submarginal cells and to *Argyramœba* by the antennal style, the shortened abdomen, and the long wing.

164. **Spogostylum austeni**, sp. nov.

?♀ *Head*: in profile, frons and face only slightly projecting; former at level of antennæ rather less than one-third the width of the head, diminishing to two-thirds of that width at vertex; black (or blackish grey?), covered with depressed small brownish-yellow scales and rather dense stiff black hair; face blackish, with dense, very elongate yellowish-grey scales and long bristly pubescence intermixed; mouth-opening large, proboscis short, labella large; antennæ black, 3rd joint short, onion-shaped, style black; occiput yellowish, upper and side eye-margins with a broad fringe of minute yellowish-grey scales. *Thorax* blackish, dorsum (apparently) covered with minute depressed brownish-yellow hair-like scales; anterior margin with a rather thin collar of very narrow and elongate milk-white scales; humeri with black bristles, and behind these a number of strong black well-curved bristles and spines nearly reaching to the wing-roots; further strong bristles occur along margin of thorax from wing-roots to hind corners;* a number of bristles curving hindwards along posterior margin of dorsum; pleuræ with grey pubescence intermixed with black bristles. Scutellum with brownish-yellow minute depressed

* There are probably in perfect specimens some very strong spines on the posterior calli, and the scars of these are visible in the present example.

scales and black hairs, traces of a marginal fringe of not very strong bristles; a bunch of yellowish-grey elongate scales below each posterior callus. *Abdomen* black, 1st segment short, covered at each side with a bunch of elongate, dirty milk-white scales; 2nd and following segments covered (except, perhaps, more or less narrowly at base) with whitish hair-like scaly pubescence, and with a transverse row of black bristles along, or just behind, the middle of each segment; some parts of the surface seem to be covered with minute black scales; a bunch of elongate dark brown scales on hinder half of sides of 2nd segment, a similar bunch of blackish-brown scales on sides of 4th segment, and others around the tip of the abdomen; sides of abdomen (except when occupied by brown scales) covered with elongate whitish scales. Venter blackish, hind margin of segments narrowly pale brown; basal half of surface with ragged whitish scaly pubescence and black bristles, hinder half apparently with less pubescence, but tip with long black bristles. Genitalia concealed, but covered with dense long bright orange scales. *Legs* black; femora with more or less greyish minute depressed scales on hinder sides and a row of black bristles below; tibiæ with usual bristles and covered closely with dark brown scales. *Wings* pale grey; costal and subcostal cells brownish yellow, the colour spreading more faintly hindwards and basally; veins dark brown, those in centre of wing distinctly and narrowly infuscated, the remainder just perceptibly suffused also, except tips of 2nd and 3rd veins; halteres black, with milk-white clubs.

Length, 15 mm.; expanse, 42 mm.

Described from a single specimen (probably a ♀) in the British Museum, from Lahore, 1910 (*G. H. Gaiger*).

Genus **ARGYRAMŒBA**, *Sch.*

Argyromœba, Schiner, Wien. Ent. Monats. iv, p. 51 (1860); E. & L. Coucke, Ann. Soc. Ent. Belg. xxxviii, p. 286 (1894).

Agyramœba, Kertész, Cat. Dipt. v, p. 59 (1909); Brunetti, Rec. Ind. Mus. ii, p. 448 (1909).

Spogostylum, Williston (*nec* Macq.), Man. N. Amer. Dipt., 2nd Ed. p. 65 (1896).

Coquillettia, Williston, Man. N. Amer. Dipt., 2nd Ed. p. 65 (1896).

GENOTYPE, *Anthrax tripunctata*, Wied.; by Coquillett's designation (1910).

This genus differs from *Anthrax* in the following characters: (1) the presence of a style to the 3rd antennal joint, distinctly bisected by a suture and with a pencil of hairs at its tip, this being the most constant generic character; (2) the face is shorter, not at all protruding, but rather withdrawn; (3) the male genitalia are practically symmetrical, not asymmetrical as in *Anthrax* and *Exoprosopa*; (4) the ovipositor, the tip of the abdomen being covered with rather long silky hairs as in *Bombylius*

etc.; (5) the fore tibiæ are beset with spinules; the tarsi have distinct joints, the ungues are rather large; in the ♂ the front tarsi are generally longer and more slender than in the ♀; (6) the knee-shaped basal angle of the 2nd longitudinal vein and the fork of the 3rd vein generally each bear a short appendix directed backwards.

The basal antennal joints are very short, the 3rd short, cone-shaped, or flattened onion-shaped, bearing a more or less slender but distinct style, which is bisected about its middle, the relative lengths of the proximal and apical portions being often a good specific character.

"Sometimes the stout basal portion of the 3rd joint is more elongate, more gradually attenuate, with a short pencil-bearing style at the end, thus showing that the portion of the style before the suture in the ordinary *Argyramœbæ* is nothing but a portion of the 3rd joint, and that the style beyond the suture alone is homologous to the style of *Exoprosopa*" (*Osten-Sacken*).

Range. World-wide, except Australasia.

Life-history. The larva of one European species, *A. trifasciata*, Mg., feeds on the larva of a mason-bee (*Chalicodoma*), to which it has to find its way through any small crack or gap in the masonry, after which it undergoes a complete change of form. The pupa is provided with special apparatus for penetrating the masonry to escape.*

Table of Species.

1. Anal cell closed	*gentilis*, Brun., p. 230.
Anal cell open	2.
2. Wings very dark blackish brown at base, the colour diminishing distally and posteriorly, but the lightest part of the wing at least pale brown	*bipunctata*, F., p. 217.
Wings always with some clear surface, with or without various markings ...	3.
3. Wings with distinct baso-costal oblique band, with or without isolated spots ..	4.
Wings without distinct baso-costal oblique band	10.
4. Wings with isolated spots on the clear part	5.
Wings without such isolated spots	6.
5. Distal margin of dark wing-band limited to enclosing anterior cross-vein and bases of discal and 4th posterior cells; spot on fork of 2nd vein and that at base of 3rd posterior cell quite isolated from the band itself and of some size; spot at base of 2nd posterior cell small, indistinct or absent.	*distiyma*, Wd., p. 218.

* An excellent translation of Fabre's description is given by Dr. Sharp (Camb. Nat. Hist., Insects, pt. ii, p. 486) and by Verrall ('British Flies,' v, p. 475).

	Distal margin of dark wing-band including the spot on fork of 2nd vein and filling basal half of 1st posterior cell (with two lighter patches), also filling half of discal cell and including spot on base of 3rd posterior cell; spot on base of 2nd posterior cell large and distinct	[p. 220. *obscurifrons*, Brun.,
6.	Legs principally yellow; * tip of abdomen without white scales..... ...	7.
	Legs all black; † tip of abdomen with conspicuous white scales	8.
7.	Legs practically wholly yellow; bifurcation of 2nd and 3rd veins only just before anterior cross-vein..... ...	*limitaris*, Brun., p. 220.
	Basal half of anterior, and all hind femora, black; bifurcation of 2nd and 3rd veins half-way between base of discal cell and anterior cross-vein.	*intermedia*, sp. n.,p. 221.
8.	Wing-band extending to middle of marginal cell, enclosing fork of 2nd vein, all the discal and anal cells, and nearly all 4th posterior cell	[p. 227. *argentiapicalis*, Brun.,
	Wing-band extending (apart from costal and subcostal cell) only to anterior cross-vein, base of discal cell, and nearly all the anal cell	9.
9.	Outer margin of wing-band distinctly oblique, lighter or darker *brown*, with a few lighter parts; anal and axillary cells always with tips quite clear for a short distance	*gestroi*, Brun., p. 222.
	Outer margin of wing-band practically transverse, nearly *black*, with no lighter parts; anal and axillary cells with barely their extreme tips clear	[p. 224. *niveicauda*, Brun.,
10.	Wings clear, costa slightly darker; several isolated spots present ‡ . ..	[p. 225. *duvaucelii*, Macq.,
	Wings practically or absolutely clear	11.
11.	Femora and tibiæ wholly yellow	[p. 228. *claripennis*, Brun.,
	Femora mainly or wholly black.	12.
12.	Larger species, 7–8 mm.; abdomen apparently covered with snow-white scales ..	[p. 229. *niveisquamis*, Brun.,
	Smaller species, 5 mm.; abdomen with short yellow pubescence, no snow-white scales	[p. 230. *nigrofemorata*, Brun.,

A. varia, F., was introduced to the Indian fauna by me (Rec. Ind. Mus. ii, p. 450) on a single specimen from Bhim Tal in the Indian Museum. The example is now headless, and it is therefore impossible to describe the species, no other specimens

* *A. appendiculata*, Big., comes here; it is impossible to place it any closer from the description.

† Occasional specimens of *gestroi* have the legs pale brown.

‡ *A. instituta*, Walk. (p. 227), comes with *duvaucelii*, and is possibly identical, but must be regarded for the present as requiring confirmation as Indian.

being available. It seems wiser to await further material rather than give an unsatisfactory description, though I still believe the Bhim Tal specimen to be correctly identified. Should *varia* really occur in India, it will be distinguished from *duvaucelii*, Macq., by the yellowish tibiæ.

A. degenera, Walk. (*Anthrax*) also comes here, but requires confirmation as Indian. It was introduced by me on three specimens in my collection from Kandy, which were identified as probably this species, but they have been sent to England and are not available for comparison.

165. Argyramœba bipunctata, *F.*

Anthrax bipunctata, Fabricius, Syst. Antl. p. 118 (1805); Wiedemann, Auss. Zweifl. i, p. 286 (1828); Brunetti, Rec. Ind. Mus. ii, p. 448 (1909).

Anthrax carbonaria, Walker, Ins. Saund., Dipt. pt. iii, p. 173 (1852).

♂ ♀ *Head*: frons blackish grey with black hairs, in ♂ at vertex less than half as wide as it is just above antennæ, where it is rather more than one-third the width of the head; in ♀ less narrow at vertex and almost exactly one-third of the head just above the antennæ; face of similar colour, with black hairs and a considerable number of black bristles in the region of the mouth, the border of which is brownish yellow; proboscis dark, with dark brown labella; antennæ blackish, 3rd joint reddish brown; ocellar triangle reddish brown; vertex blackish grey, rather shining, with some brown hairs on hind margin. *Thorax* black, moderately shining, with very sparse pubescence; long black bristly hair on anterior margin, carried downwards, forming a complete collar; also on and below shoulders and on mesopleuræ; humeral and posterior calli dark brown, latter with strong black spines; some spines towards sides of thorax; pleuræ blackish grey, sparsely pubescent. *Abdomen* black, with short sparse black pubescence and a patch of small elongate snow-white scales towards each side of dorsum of 1st segment; a bunch of scale-like black bristles on the actual sides of that segment; sides of all segments with stiff black hairs; venter black, with moderately long stiff black hairs. Genitalia in ♂ large and complex, turned slightly but distinctly to the left, shining bright brown, with sparse hairs, a little blackish here and there; consisting of an oblong slightly curved dorsal plate, a pair of claspers, the 1st joint large and conical, the 2nd very small, finger-like, horny, pointed, slightly curved; a large bulbous lower piece; an intermediate pair of pale yellow filamentous organs, and a very large semicircular ventral plate; genitalia in ♀ concealed. *Legs* black, tibiæ often more or less dark mahogany-brown; coxæ with numerous black bristly hairs, femora and tibiæ with small grey scales closely applied, and with black bristles; both scales and bristles more conspicuous on hind legs; tarsi with black pubescence and short bristles, which are stronger on hind pair. *Wings* dark blackish brown on anterior

part for three-fourths of their length, the colour gradually diminishing in intensity hindwards to the wing-margin, which is dark grey; halteres dark brown.

Length, 15–16 mm.

Described from four ♂ ♂ and two ♀ ♀ in the Indian Museum, mostly in inferior condition, from Karachi, Calcutta, and Purneah (Bengal); also seen from Kumaon, v. 1910 (*Chatterjee*); Pusa, Bengal, 16. vi. 1909, 3. vii. 1906; Chapra, Bengal; Surat, Bombay, 14. iii. 1904; Assam, v. 1913; Konau Kuppam, 16–20. vi. 1913. This is a very marked species, and cannot be confused with any other in the family.

Types in the Copenhagen and Vienna Museums.

166. **Argyramœba distigma**, *Wied.* (Pl. III, fig. 10.)

Anthrax distigma, Wiedemann, Auss. Zweifl. i, p. 309 (1828).
Spogostylum distigma, Coquillett, Proc. U.S. Nat. Mus. xxi, p. 318 (1898).
Argyramœba distigma, de Meijere, Tijd. v. Ent. l, p. 241 (1907) Brunetti, Rec. Ind. Mus. ii, p. 449 (1909).
Anthrax argyropyga, Doleschall, Nat. Tijd. Ned. Ind. xiv, p. 401 (1857) and xvii, p. 93 (1858).
Anthrax tripunctata, Wulp, Tijd. v. Ent. xi, p. 109, pl. iv, fig. 1 (1867); Osten-Sacken, Ann. Mus. Gen. xvi, p. 433 (1882).

♂ ♀ *Head*: frons a little more than one-third the width of the head above antennæ, about three-fifths of this width at vertex, blackish grey, with black pubescence, and over more than the lower half the usual small grey scales; face dark grey, with fine black hairs at sides and bristly hairs around mouth-border, which latter is yellowish white; proboscis dark brown, with large dark brown labella; occiput blackish grey, with greyish-white scales near eye-margins and a fringe of dark brown hair on hind border. Antennæ black; 1st and 2nd joints very short, with black bristles; 3rd short, stumpy onion-shaped, the produced part very narrow at base, cylindrical; the style distinct, rather long, with a conspicuous pencil of hairs at tip. *Thorax* black; dorsum wholly covered with minute adpressed hairs like grey scales; a rather thick collar on anterior margin of elongate very narrow grey scales, behind which are numerous rather long bristly black hairs; a large patch of similar elongate grey scales over the humeral region and in front of the wing-base; hind margin of dorsum with a little longer grey pubescence mixed with bristly black hairs, and a row of curved black bristles near the edge; black bristles of various sizes occur along both side-margins of the dorsum, whilst the hind corners of the thorax bear fine powerful black spines directed backwards; pleuræ covered with short grey pubescence, with black bristly hairs intermixed. Scutellum black, with minute adpressed grey hair-like scales and a row of ten or more strong black bristles on hind margin, besides numerous irregularly-placed black hairs. *Abdomen* black; 1st segment rather dark bluish grey, with fine black pubescence, and at each anterior corner a large conspicuous

bunch of very elongate narrow milk-white scales; rest of dorsum covered with minute black adpressed scales, with numerous black hairs intermixed, and a row of longer curved ones towards hind border of each segment; towards and over the sides of each segment after the 1st, a bunch of long dark brown scales with longer black hairs; a small white scale-spot occurs towards each side on hind borders of 2nd and 3rd segments; along the base of 3rd and hind margins of 3rd, 4th and 5th segments are small silvery-white scales irregularly placed, or sometimes forming a narrow complete band; tip of abdomen more or less covered with long broad white scales, extreme tip with copious long black hairs; genitalia mainly concealed, the surrounding pubescence long, light brownish yellow. *Legs* black; upper side of femora more or less with minute adpressed whitish scales; posterior pairs with some black bristly hairs below, which are much stronger on hind pair; tibiæ and tarsi dark brownish yellow, latter blackish towards tips; anterior tibiæ with minute whitish scales, middle pair with dark brown overlapping scales. *Wings* nearly clear, with dark brown basocostal band, extending from towards end of costa, leaving extreme tip of subcostal cell clear, slightly irregularly to anterior cross-vein, thence encroaching narrowly over the edges of basal half of discal cell, thence to anal margin, cutting anal and axillary cells about their middles, generally leaving anal margin itself nearly clear. The outline of the brown colour is thus in general direction straight, yet actually always more or less zigzag. A small roundish brown spot over fork of 3rd vein and reaching to 2nd vein; a similar smaller spot over base of 3rd posterior cell; and distal margin of discal cell narrowly infuscated; halteres dark brown, with yellowish-white knobs.

Length, 6–11 mm.

Described from a good series of both sexes in the Indian Museum, Pusa, Dehra Dun, and my own collections. It is generally distributed in India from February to May, and in September and October, so that it may be two-brooded yearly. Recorded from Pusa practically all the year round. Darjiling, 1000–3000 ft.; Singla, Darjiling Distr.; Runjit Valley, Sikkim; Naini Tal; Calcutta; Lucknow; Parasnath; Siripur; Kushtea; Medha; Purneah; Pophli; Chiplun; Hamirpur; Guindy, Madras; Ootacamund, S. India, 7500 ft. (*Fletcher*); Mettupalaiyam, S. India; Bangalore; Khasi Hills; Moulmein; Kawkareik, Amherst Distr., Tenasserim; Kandy, Ceylon.

Type in the Leyden Museum.

This species shows considerable variation, mainly in the extent of the small white scales on the abdomen and in the wing-markings, the three isolated spots being often much reduced in size, or one or more may be absent; in one specimen, taken on board ship 10 miles off the Madras coast, all three are absent. The variety *tripunctata*, Wulp, has these three spots reduced exceedingly, and the dark band fills the whole of the anal and axillary cells.

167. **Argyramœba obscurifrons,** *Brun.* (Pl. III, fig. 11.)

Argyramœba obscurifrons, Brunetti, Rec. Ind. Mus. iii, p. 216 (1909).

♀ *Head*: frons moderately wide at vertex, increasing to double the width at level of antennæ, where it forms one-third the width of the head, grey, with blackish patches, covered rather thickly with black hairs and with some whitish scales intermixed just above the antennæ; ocellar triangle distinct, small, with some hairs; antennæ with 1st and 2nd joints black, bristly; 3rd grey-dusted, bare, apical style rather short; underside of head blackish grey, with a moderately thick band of bristly hairs across lower part of face; proboscis withdrawn, apparently dark brown; occiput dark grey, minutely pubescent, with some minute pale scales just behind the eyes, which latter are black. *Thorax* blackish grey, with a rather thick fringe of bristly hairs in front, reaching over the shoulders and continued below; bristly hairs between the shoulders and the roots of the wings; sides lighter grey, with occasional whitish reflections, nearly bare; scutellum blackish grey, with soft black hairs. *Abdomen* black, covered mainly with soft black hairs; a thick bunch of white hairs on each shoulder, behind which, on the posterior border of the 1st segment, near each side, are a few snow-white scales; there is also a row of white scales (more or less interrupted in the middle) on the posterior border of the 2nd segment, and another on the last segment. Venter black, softly pubescent, with some whitish hairs in centre, and a longitudinal stripe of short yellowish hairs near the tip. *Legs* black, minutely pubescent; femora with a few soft black hairs below; posterior tibiæ with short bristles on outer and hinder sides. *Wings* very pale grey, with the oblique baso-costal dark brown band occupying nearly half the wing, passing across the middle of the discal cell (where it is somewhat extended) to the hind margin of the wing, which it reaches just before the tip of the anal cell; the colour is extended also from the costa to about the middle of the first posterior cell, enclosing a clear spot near the base of the first submarginal cell, and another near the base of the first posterior cell; on the outer cross-vein there is a circular spot, and a trace of a small one on the costa, near the tip of the marginal cell; halteres yellowish.

Length, 7 mm.

Described from a single specimen in the Indian Museum from Phagu, 9000 ft., Simla District, 14–15. v. 1909 (*Annandale*).

168. **Argyramœba limitaris,** *Brun.*

Argyramœba limitaris, Brunetti, Rec. Ind. Mus. iii, p. 217 (*limitarsis,* lapsus) (1909).

♀ *Head*: frons one-fourth of head and vertex, widening to one-third at level of antennæ, with rather thick brownish-black

hairs; ocellar triangle inconspicuous; face blackish, with hairs which from above appear whitish grey; antennæ with 1st joint black (remainder missing); proboscis withdrawn, with mouth-border reddish brown; back of head only slightly puffed out, blackish grey, with some whitish hairs. *Thorax* shining black, with some yellowish-white hairs and stiffer bristles towards the posterior corners; sides of thorax black, with some whitish hairs; scutellum dark cinereous grey, with vestiges of some short yellow hairs, and a few pale yellow bristles on posterior margin. *Abdomen* blackish grey, with a slight brownish fringe, covered more or less sparsely with short pale yellow hairs, most conspicuous on borders of segments; a bunch of whitish hairs on each shoulder of the 1st segment; venter with whitish hairs. *Legs*: coxæ yellowish grey, with whitish pubescence; femora and tibiæ pale yellow, the latter with minute bristles; tarsi blackish towards tips. *Wings* nearly clear; a rather bright yellowish-brown baso-costal band extends along the costa just beyond the middle, thence extending posteriorly along a line comprising the inner cross-vein, the base of the discal cell, and the outer side of the second basal cell; below this cell the colour immediately fades away to a pale grey, which covers the anal and axillary cells. Appendix of the upper fork of the 2nd vein short but distinct. Halteres creamy yellow.

Length, 5 mm.

Described from a perfect specimen (except for the missing antennæ) in the Indian Museum from Hathikund, Garhwal District, base of Western Himalayas, 3. v. 1909.

169. **Argyramœba intermedia**, sp. nov.

♂ ♀ Closely resembling *Aphœbantus ceylonicus*, Brun. Antennal 3rd joint short onion-shaped, prolonged into a long style, with the tip bisected, bearing the normal pencil of hairs and a central microscopic bristle; 1st antennal joint flattened and spread out, whitish, with white, not black, bristles.

It differs from *ceylonicus* as follows:—(1) In the subfamily character of the comparatively long præfurca, which in *Aphœbantus* is relatively short; in *intermedia* the 2nd and 3rd veins diverge opposite half-way between base of discal cell and the anterior cross-vein. (2) Frons in ♂ of appreciable width at vertex (in *ceylonicus* the eyes are almost contiguous there); frontal pubescence more whitish than yellow. (3) General pubescence of thorax, pleuræ, and abdomen yellowish grey or whitish, never bright yellow. (4) Abdomen wholly blackish grey. (5) The baso-costal half of wing rather bright brown; the line of demarcation running from tip of 1st vein to tip of anal cell, cutting the discal cell at about its middle; the outline mainly straight, but not sharply defined. (6) Basal half of anterior femora, and all the hind femora (except narrowly at base and, perhaps, tip)

blackish grey, though covered with white scales and pale pubescence.

Length, 6 mm.

Described from two specimens in good condition in the Indian Museum from Puri, Orissa Coast, 24–28. i. 1918 (type) (*Annandale* and *Gravely*); Allahabad, iii. 1916 (*Howlett*). Two other specimens in bad condition in the British Museum are from Trincomali, 24. ix. 1891 (*Yerbury*).

The four examples in the Indian Museum from Allahabad differ from the typical form by the sides of at least the 2nd and 3rd abdominal segments being more or less yellowish; and by all the legs being yellow, except the black band at the base of the fore femora and a broad apical or subapical one on the hind femora. The specimens are also slightly larger.

Two ♀ ♀ in the Indian Museum differ from typical *intermedia* only in all the legs being orange, with at most the extreme tip of the hind femora on the upper side with a very small black streak and a few tiny black bristles. The wings are wholly clear, the costal cell pale yellowish. In one specimen a faint basal suffusion, extending only a short distance, is apparent. The 1st antennal joint is as in true *intermedia*.

170. **Argyramœba bigoti,** nom. nov.

Argyramœba appendiculata, Bigot, Ann. Soc. Ent. Fr. lxi, p. 347 (1892).

"Antennæ, face, and frons black; thorax black, with a little grey pile and some black hairs, bright in front as well as on the sides; scutellum dark brown, with a little grey pile; halteres tawny, knobs yellowish white. Abdomen (denuded) black, some black hairs at tip, also at sides; legs reddish, except the femora, which are black nearly to the tip. Wings hyaline, at base broadly dark brown, this colour extending to two-thirds of the anal cell, covering by a light extension the external transverse vein; the angles formed by the 3rd vein and the forking of the 4th (*Rondani*),* with rather long appendices.

"Pondicherry, 2 specimens."

Type in the Bigot collection.

The name *appendiculata* has been used twice before in this genus, on both occasions by Macquart, firstly in 1849 for an Algerian species described as a *Lomatia*, and secondly in 1855 for a species from North China under the genus *Anthrax*.

171. **Argyramœba gestroi,** *Brun.* (Pl. III, fig. 12.)

Argyramœba gestroi, Brunetti, Rec. Ind. Mus. vii, p. 470, pl. xxxvii, fig. 7 (1912).

♂ *Head*: frons immediately above antennæ one-third the width of the head, diminishing to half that width at vertex,

* Meaning Rondani's terminology.

covered not very closely with elongate bright yellow hair-like scales, these being absent towards the vertex; also with stiff black hairs from vertex down to and below antennæ. Antennæ blackish grey, 3rd joint shortly conical, with rather long style, and the usual pencil of short hairs at tip. Underside of head black, some stiff black hairs and a small quantity of deeper yellow hair-like scales on each side below, but not contiguous to, base of antennæ; mouth-opening small, black; occiput rather widely produced behind eyes, black, with a patch of small yellow scales behind the middle of each eye, and a fringe of very thick short dark brown hairs at hinder margin of occiput. *Thorax* (somewhat denuded) black, with moderately thick bright yellow and whitish-grey bristly scale-like hairs intermixed around the shoulders, the sides and anterior margin of dorsum, the whitish-grey scaly hairs in this latter part being more prominent; dorsum with very short recumbent bright yellow hairs; the usual strong bristles towards the sides; a certain quantity of stiff black hairs on anterior and posterior parts of thorax, whilst the dorsum is lightly covered with softer sparser black pubescence. Scutellum blackish, sometimes dull reddish brown, with very short recumbent bright yellow hairs and soft black pubescence, and a row of about twelve long curved brownish-yellow bristles on posterior margin. *Abdomen* blackish, with short bright yellow recumbent hairs and longer yellow bristly hairs, more or less in a row towards the hind border of each segment; at each side at the base of the abdomen a large bunch of long milk-white scale-like bristly hairs, the edges of the segments bearing rather thick yellow bristly hairs, with some similar long black hairs about the middle of the actual edges of each segment; the last three or four segments bear some large elongate milk-white scales, and isolated similar scales are attached here and there towards the sides of the posterior margins of some of the other segments. Venter blackish, with rather thick yellow and white hairs on the posterior borders of all the segments; genitalia rather large, concealed, brownish yellow, apparently consisting of a pair of plates. *Legs* with coxæ and femora dark brown; fore coxæ, at least, with some yellow hairs and black bristles; tibiæ and tarsi brownish yellow, both, with the femora also, with very short bristles. *Wings* hyaline; basal half blackish brown, the limits of the colour forming an irregular diagonal line from the fork of the 2nd longitudinal vein (which is immediately above the anterior cross-vein) towards the anal margin of the wing (though the colour dies away at the border), and just enclosing the base of the discal cell and the posterior cross-vein; costal and subcostal cells blackish brown to their tips; a semi-hyaline elongate spot in marginal cell immediately proximad of fork of 2nd longitudinal vein, another similar spot just below it, in first basal cell, in which same cell there is a third similar spot towards its base; an irregularly-shaped semi-hyaline spot of some little size at upper outer angle of 2nd basal cell; halteres yellowish, with whitish clubs.

Length, 6–8 mm.

Described from several specimens in the Indian Museum from Medha, Yenha Valley, Satara District, 2200 ft., Bombay Presidency, 17–23. iv. 1912 (*Gravely*—type); Pallode, Travancore, 13. xi. 1908 (*Annandale*); Bangalore, iii. 1910; Chapra, Bengal (*Mackenzie*).

This species is very near *A.* (*Anthrax*) *carbo*, Rond., but Prof. Gestro has very kindly compared a specimen with Rondani's type in the Genoa Museum and pronounced it quite distinct, in spite of the similarity of characters contained in the description of that species. It is with pleasure, therefore, that I name the present species after Prof. Gestro.

The legs are sometimes much paler, occasionally wholly pale brown.

172. **Argyramœba niveicauda**, sp. nov.

♂ ♀ *Head*: frons in ♂ two and a half times, in ♀ less than twice as wide at level of antennæ as at vertex, dark grey, covered rather thickly with stiff black hairs, and on lower part with small elongate snow-white scales intermixed; face dark grey, with black bristly hairs and some pale softer hairs around mouth-opening; antennæ black, 3rd joint microscopically grey-dusted; occiput considerably puffed out, with a fringe of short brown hairs around hind margin, and some minute snow-white adpressed scales around eye-margins. *Thorax* black, dorsum with short black pubescence; anterior margin with collar of whitish-grey scaly pubescence, with a fringe of long black scales immediately behind it; some whitish scaly pubescence from shoulder nearly to wing-base, surmounted by a fringe of black bristly pubescence; pleuræ blackish grey, with black softer pubescence. Scutellum black, with black pubescence and apparently a few minute whitish scales; hind border with black bristles. *Abdomen* black, with recumbent black bristly pubescence and (apparently) the surface covered, except where scales are present, with minute dead-black adpressed scales; 2nd and 3rd segments, at least towards sides, with small snow-white scales on hind margins,* 5th segment with a small patch on hind margin near each side; 6th and 7th wholly covered with larger brilliant snow-white scales; hind borders of all segments, including the last two, with a row of fine bristly hairs; genitalia light brown; venter black, with some fine pubescence; actual sides of abdomen, except 6th and 7th segments, with very long dark brown scaly or bristly pubescence. *Legs* dark brown; femora and tibiæ with closely-impressed dull greyish scales that shine in certain lights; pulvilli white. *Wings* clear, distal half highly iridescent; basal half brown or blackish brown, the colour filling costal cell, and otherwise limited by a slightly irregular line from tip of 1st vein to tip of anal cell, embracing anterior cross-vein, but not encroaching on 3rd posterior cell. Anal cell just closed on border in type ♂ and second ♀,

* In more perfect specimens these scales may form a complete transverse band.

narrowly open in type ♀: halteres dark brown, with dull creamy-yellow knobs.

Length, 6½–7 mm.

Described from three specimens in rather good condition: Pallode, Trivandrum, Travancore, 15. xi. 1908 (*Annandale*), type ♂; Calcutta, 1. vi. 1909, type ♀; Sylhet (*Maj. Hall*); Chapra, Bengal.

Types in the Indian Museum.

This species evidently bears some resemblance to de Meijere's *fallax*, from Java, and was recorded erroneously by me as that species (Rec. Ind. Mus. ii, p. 449, and iii, p. 221).

173. **Argyramœba duvaucelii**, *Macq.* (Pl. III, fig. 13.)

Argyramœba duvaucelii, Macquart, Dipt. Exot. ii, 1, p. 63, pl. xx, fig. 7 (1840).

Anthrax duvaucelli, Brunetti, Rec. Ind. Mus. ii, p. 452 (1909), and iii, p. 219 (1909).

♂ ♀ *Head*: frons at level of antennæ one-third the width of the head, narrowing at vertex to one-third of this width (♂) or about half this width (♀), blackish grey, with short soft black hairs; face with moderately long and thick white hairs; mouth-border very narrowly yellow; proboscis dark brown, shining, hairy. Antennæ black, with a slight greyish-white shimmer; first two joints with black bristles; third bare, prolonged into the usual style, which is pale at the tip, the pencil of hairs quite distinct. Vertex of head with a distinct but short and deep indentation, from which a central dark grey hairy protuberance arises, bearing the red ocelli, placed closely together. *Thorax* dark cinereous, the dorsum with sparse yellowish short hairs round the edges; anterior part with a dense fringe of very narrow long greyish-white scales, intermixed behind with long soft black hairs, these latter continuing more or less over the whole dorsum, but rather shorter; sides of thorax with long thick greyish-white scaly pubescence, thickest and most scaly below the humeral region, thinner, shorter, and whiter posteriorly, and extending somewhat sparsely above the insertion of the wings. Scutellum blackish cinereous, covered with rather sparse but long soft black hairs and with traces of short yellow hairs around the whole scutellum; a row of stiff hairs on posterior margin. Several strong black spines below the edge of the dorsum anterior to insertion of wing; the posterior calli also moderately conspicuous and bearing a few stiff long bristles. *Abdomen* blackish grey; 2nd segment distinctly but not greatly longer than the five remaining ones; the whole dorsum apparently covered with small yellowish-white or quite white scales, which may be thickest at the bases and posterior margins of the segments; the whole surface is also covered lightly with moderately long soft black hairs, and there is a bunch of long whitish scaly pubescence at each side of the first segment, which is continued along the sides of the abdomen. Venter blackish, with short white hairs; longer white pubescence towards the base, and the last segment (in the ♂ only)

with rather closely-placed, somewhat large, and elongated snow-white scales, which sometimes spread over the last two, or even three, segments and extend round over the sides. In the ♀ these white scales below the abdomen are absent, and are replaced by long black hairs on the ultimate segment. The genital organs in the ♂ consist of a pair of stout upper claspers (?), the apical half tapering to a blunt point, each with a small lamella at the tip; this large organ is rufous brown, a little blackish above at the base, and with some reddish-yellow hairs on the inner sides; below these large claspers are some further, apparently complex organs, which are not easily visible, the whole being protected by a large black curved ventral plate, bearing on its margin reddish hair near the base and black hair posteriorly. In the ♀ the genital organs consist of a rather large subconical process with dense reddish or yellowish hair; in one example this organ is almost wholly withdrawn within the abdomen. *Legs* black; coxæ with rather long silky white hairs; femora and tibiæ with small whitish scales, which extend, more sparsely, to the tarsi; all the femora with soft hairs below and some irregular weak bristles: the tibiæ generally with small, apparently irregularly-placed spines, the most regular being a row on the outer side of the hind tibiæ; all the legs minutely pubescent. *Wings* almost clear, first posterior cell rather widely open; fifth generally narrowly open, but in two specimens closed exactly on the margin; the lower side of the discal cell occasionally with the beginning of a very small appendix. Costal cell and extreme base of wing brownish yellow; subcostal cell dark brown, very narrow. Fork of the third longitudinal vein sharply angled, and with only a tendency to appendiculation (which actually occurs only in two or three specimens, in two of which, moreover, there is an additional veinlet in one wing only, this veinlet producing the cell usually characteristic of *Hyperalonia*). A dark brown suffusion, distinct but small, occurs at the base of the second vein, joined to that of the inner cross-vein; suffusion also at the angle of the fork of the third vein; over the outer cross-vein the colour carried upwards along the inner side of the discal cell; also over the lower extremity of the veinlet, connecting the two branches of the fourth longitudinal. Costa minutely spinose, with the usual spiny portion at the base. Halteres light brown, tip of club creamy; tegulæ milk-white, with snow-white hair; alulæ concolorous with wing, bearing a fringe of minute black hairs.

Length, 8–10 mm.

Described from several of each sex taken at Bhogaon, Purneah District, N. Bengal, 19–26. iii. 1909 (*Paiva*); the Indian Museum also has a specimen from Sahelwa, Bahraich District, United Provinces, 11. iii. 1909 (*Hodgart*); and the British Museum one from the Kangra Valley, 4500 ft., vii. 1899 (*Dudgeon*). Other specimens seen by me are from Pusa, iii, iv, ix, x (common), bred from cells of the wasp, *Sceliphron coromandelianum*; also taken at light: Lahore, 29. iii. and 16. iv. 1909; Dum Dum, vi. 1913 (*Chatterjee*), 4. viii. 1913, 9. vii. 1913; Murree Hills, 4500 ft.,

2. vi. 1913 (*Beeson*); Chapra, Bengal (*Mackenzie*); Allahabad, 24. iii, 7. iv. 1906 (*Howlett*).

Type in the Paris Museum.

174. Argyramœba argentiapicalis, *Brun.* (Pl. III, fig. 14.)

Argyramœba argentiapicalis, Brunetti, Rec. Ind. Mus. vii, p. 470 pl. xxxvii, fig. 6 (1912).

♀ *Head*: frons at level of antennæ rather less than one-third width of head, black with black hairs, with which are intermixed on the lower part some dirty greyish scales; antennæ black, normal; face black, with thick black bristly pubescence and some greyish scales; proboscis dark; mouth-opening very narrowly pale; occiput wholly black. *Thorax* blackish or blackish grey, with very short black pubescence and with mainly black bristly hairs on anterior margin, around the wings, and about the shoulders and pleuræ; a few grey hairs intermixed adjacent to the head. *Abdomen* black, shortly black pubescent; a spot formed of silvery-white scales towards the sides on the hind borders of 1st and 2nd segments; a few intermediate scales suggest the possibility that in some specimens the whole hind border of at least the 2nd segment may be similarly scaled; the tip of the abdomen (two segments) covered with very conspicuous, elongate, shining silvery-white scales, which are sparser or nearly absent on the median line; venter black, black pubescent; genitalia comparatively prominent, dull brown, consisting of a pair of large lamellæ and other parts; anterior corners of abdomen with copious greyish-white hairs; sides with black hairs. *Legs*: femora black, bearing a little sheen through the presence of very small, greyish, closely-impressed scales; tibiæ and tarsi reddish brown; the usual pubescence. *Wings* clear, more than the basal half dark brown; the line of demarcation, which is emarginate at each of the veins it crosses, running from the tip of the 1st longitudinal vein to the middle (on wing-margin) of the posterior cell, thus passing distad of the base of the 3rd vein and the discal cell. Anal cell closed just before or actually on the wing-margin; the endings of the 4th longitudinal vein are liable to variation, as in the type there is an extra cell formed below the discal cell (in one wing only), caused by the upper prong of the lower branch of the 4th vein curving towards and joining the lower prong, thus closing the 4th posterior cell. In the dark part of the wing are small lighter yellowish spaces irregularly disposed; halteres black.

Length, 5–7 mm.

Described from three ♀ ♀ in the Indian Museum from Mahabaleshwar, Satara District, 4200 ft., Bombay Presidency, 13–16. iv. 1912 (*Gravely*).

175. Argyramœba instituta, *Walk.*

Anthrax instituta, Walker, Ins. Saund., Dipt. pt. 3, p. 183 (1852).

♀ "Black. narrow, head clothed above with brown hairs, in front with tawny hairs; chest beset with black bristles; breast

hoary, clothed with whitish hairs; abdomen grey, obconical, a little shorter than the chest, beset with a few black bristles, clothed on each side and at the base with dull pale yellow hairs; legs black, clothed with short black hairs and bristles; shanks pitchy, thighs tinged with grey; wings grey, rather long and narrow, adorned with four brown spots which cloud the cross-veins; wing-ribs pitchy, veins black, pitchy at the base and along the fore border; poisers pitchy, with tawny knobs.

"Length of body $3\frac{1}{2}$ to $4\frac{1}{2}$ lines, of the wings 10–12 lines. East India." (*Walker.*)

Type in the British Museum.

176. **Argyramœba claripennis**, *Brun.*

Argyramœba claripennis, Brunetti, Rec. Ind. Mus. iii, p. 218 (1909).
Argyramœba hottentotta, L., var. *claripennis*, Brunetti, Rec. Ind. Mus. ii, p. 452 (1909).

♂ *Head*: frons one-fourth width of head at vertex, broadening at level of antennæ to one-third, dark grey, with yellowish hairs, which on the face become greyish or nearly white; ocellar triangle inconspicuous. Antennæ black, with the uppersides of the joints greyish; basal joints with rather thick hairs; bisection of style obvious, pencil of hairs small. Proboscis dark, withdrawn; occiput dark grey, with thick yellowish-grey hairs in the middle. *Thorax* blackish grey, with short yellow hairs, of which a bunch of a paler colour is placed on each shoulder; a long and a shorter yellow spine in front of each wing, and five or six long yellow bristles towards each posterior corner, also some yellow bristles towards posterior margin of dorsum. Scutellum dark grey, with short yellow hair, and some yellow bristles on posterior margin. Sides of thorax ash-grey, white-dusted, with a bunch of greyish-white hairs below each shoulder and whitish hairs below this again. *Abdomen* blackish, hardly shining; posterior margins of segments with rather wide, light brown bands; whole dorsal surface apparently covered with short, soft, bright yellow hairs, which become longest towards the sides on the posterior margin of the anal segments, where the brown segmental margins are also widened. Venter blackish grey, with minute elongated whitish scales, and becoming reddish yellow towards tip; there are two long pendent bristles towards the posterior margin about the middle of each ventral segment. Genitalia not conspicuous, but withdrawn. *Legs* uniformly pale yellow, except the blackish tips of the tarsi; the coxæ and femora rather thickly, the tibiæ slightly, covered with minute whitish woolly scales, the tibiæ bearing moderately short black bristles in addition, as do also the hind femora near the tip; there is a row of microscopic bristles on the hinder side of the hind tibiæ. *Wings* quite clear; submarginal cell brownish yellow; appendiculation not obvious; 2nd vein originating half-way between base of discal cell and anterior cross-vein, its upper branch forming a very distinct downward loop towards its end; halteres yellow.

Length, 7 mm.

Described from a single perfect example in the Indian Museum from Lahore, 8. v. 1908.

177. Argyramœba niveisquamis, *Brun.*

Argyramœba niveisquamis, Brunetti, Rec. Ind. Mus. ii, p. 472 (1909).

♀ *Head*: frons widening gradually from one-fifth the width of the head on the moderately wide vertex (where the ocelli are very close together on a very reduced tubercle) to fully one-third the width at the level of the antennæ; frons and face densely covered with long drooping snow-white scales, with a few longer thin black hairs intermixed, also (more numerously) white bristles, which are longer than the scales; oral orifice oblong, white; proboscis (in one specimen, the other is headless) wholly withdrawn; antennæ black, second joint very short, third blackish grey, onion-shaped, tip drawn out into a blunt definite style; (there is no trace of the usual pencil of hairs, but the antennæ, of which only one remains, may be incomplete); back of head and underside dark grey, thickly covered with snow-white scales. *Thorax* black, almost wholly covered with snow-white bristly hairs, which are longest in front (below), in front of the wings and below them; the hairs become scaly in places, and on the posterior border of the scutellum is a moderately thick band of white scales. *Abdomen* black, the segments covered thickly with short creamy-white and snow-white scales; a fan-shaped bunch of snow-white, comparatively softer, long hairs on the anterior corners; a few long scattered black bristles on the dorsum, and, rather more numerously, along the sides of the abdomen. Venter with scaly and bristly hairs mixed; tip of abdomen with a few rather long brownish-yellow bristly hairs, with some longer fine black hairs below. *Legs*: femora dark brown, with closely-set small snow-white scales; posterior femora with isolated strong black bristles; tibiæ pale brown, with silvery snow-white scales and more numerous short black spiny bristles; tarsi brown, with scattered small white scales, tips of each joint blackish, claws black. *Wings* clear, at the base of the costa a bunch of snow-white scales with some black bristles intermixed; a very small brown suffusion at the base of the third vein and on the discal cross-vein; mediastinal and marginal veins brown, also the narrow intervening space. A strong appendix at the base of the second vein and at the base of the fork of the third vein; discal cell rather long; second posterior cell two-and-a-half times as wide on wing-border as at base. Halteres pale brown, club much lighter; tegulæ whitish, nearly transparent, with a fringe of very short white hairs.

Length, 7–8 mm.

Described from two specimens in the Indian Museum from Baluchistan (one headless).

I thought this might be *nivea* of Ross or perhaps Griffini's var. *lioyi*, but no mention is made by them of the *scales* with which it

is covered; moreover, the other differences are sufficient to warrant regarding my species as distinct.

178. **Argyramœba nigrofemorata,** *Brun.*

Argyramœba nigrofemorata, Brunetti, Rec. Ind. Mus. iii, p. 219 (1909).

♂ *Head*: frons very narrow, about one-twelfth of the width at vertex, enlarging to nearly one-third at level of antennæ, dark grey in colour, becoming gradually ash-grey on the face below the antennæ, with moderately thick black hair; face with thick soft white hair; antennæ black, normal, bisection of style distinct, pencil of hairs very short; proboscis brown; back of head ash-grey, with minute pubescence and some rather short thick yellowish hairs towards lower part. *Thorax* blackish grey, with short yellow hairs intermixed with stiff short black bristly hairs; anterior margin with rather long bristly yellow hairs; a longer and a shorter yellow spiny bristle in front of each wing-base; sides of thorax light grey, with pale yellowish or whitish hairs; scutellum concolorous with thoracic dorsum, and with some longer bristles towards posterior margin. *Abdomen* subconical, blackish grey, with soft short yellow hairs; venter mainly yellow, with longer yellow hairs; genitalia apparently large and complicated, but withdrawn. *Legs*: coxæ blackish, with reddish-yellow tips and whitish hairs; femora black, with bases and tips reddish yellow, whitish-grey scales, and a little soft whitish hair below; tibiæ reddish yellow, with small black bristles, and with thicker shorter black bristles on hinder side, all the bristles on the hinder pair being stronger than on the other pairs; tarsi brown, closely pubescent, black towards tips, pulvilli yellow. *Wings* quite clear; subcostal cell yellowish brown; 2nd vein originating in a knee just beyond half-way between base of discal cell and anterior cross-vein; appendiculation distinct; upper branch of 2nd vein forming a very distinct downward loop towards its end; halteres rather deep yellow.

Length, 5 mm.

Described from a perfect ♂ in the Indian Museum taken at Hathikund, Garhwal District, base of Western Himalayas, 3. v. 1909.

A second specimen in the Indian Museum is probably this species, but the black on the anterior femora only extends to a little beyond the middle, and the sides of the abdomen are distinctly orange; from Helvak, Koyna Valley, Satara Distr., Bombay, 4. v. 1913.

179. **Argyramœba gentilis,** *Brun.* (Pl. III, fig. 15.)

Argyramœba gentilis, Brunetti, Rec. Ind. Mus. ii, p. 470 (1909).

♂ ♀ *Head*: frons and face dull black, with black hairs; antennæ black, third joint much flattened, forming an irregularly oval disk; style distinct, black, no apparent bisection, with small pencil of short hairs at tip; proboscis short, thick; back of head blackish grey, bare. *Thorax* black, with a collar of stiff black

hairs on anterior margin, and soft black hairs on dorsum and sides, intermixed with some black bristles on the shoulders and posterior calli; posterior margin with some long black bristles deflected backwards; scutellum black, with short black pubescence, and some longer, curved bristles on posterior border. *Abdomen* dull black, with short, rather sparse, black pubescence, and a bunch of long black hairs on each shoulder; some black hairs at the sides and some longer thicker black hairs at tip; venter black. *Legs* black, minutely pubescent; tibiæ a little lighter, with short black bristles (including fore pair). *Wings* clear, elongated, anal cell closed; a blackish-brown band from the base, extending along the costa to just above the fork of the third longitudinal vein; the rather irregular external border of this band extends to the posterior wing-border, just in front of the anal cell, which the dark band wholly fills; the band does not quite reach the fork of the third vein nor the outer cross-vein; near the wing-tip an oblong (almost subtriangular) blackish-brown spot on the costa, barely united to the broad band, and extending downwards and outwards to just below the proximal end of the fork of the third vein, thus leaving the absolute wing-tip narrowly clear. The second longitudinal vein forms a distinct angle at the commencement of the downward loop, somewhat as in *Lepidanthrax*.

Length, 4½ mm.

Described from a ♂ (type) in the Pusa collection, taken, 24. iii. 1906, at Larksom, Bengal, and from a ♀ in the Indian Museum collection from Margherita, Assam.

I retain this species under *Argyramœba*, mainly because the pencil of hairs at the tips of the antennal style is regarded by Osten-Sacken as the most important generic character, and, though small, these hairs are present in this species. The bisection of the style is, however, not apparent, nor does the fork of the third vein show the usual appendix. The very flattened, irregularly oval, third antennal joint, the long, rather narrow abdomen, and the long wings approximate it to *Argyramœba* rather than to *Anthrax*. In one or two respects it resembles *Astrophanes*, O.-S., a genus containing but one species (from Mexico); these are the "almost rudimentary development of the base of the costa and the closed anal cell." These two characters, in conjunction with the contiguity of the eyes on the vertex in the ♂, are regarded as the main generic distinction of the genus. As, however, I believe both sexes to be before me, my species cannot be an *Astrophanes*. The angled loop of the second vein approximates it to *Lepidanthrax*, O.-S., so that for the present it should be regarded as a somewhat aberrant species. It seems to bear some resemblance to Bigot's *Argyramœba appendiculata*, and it is just possible it may be identical with it, but the ♀ in the Indian Museum collection is labelled as a distinct species by Bigot (erroneously as a ♂), and I therefore treat it as such. When the two sexes are placed side by side the difference of width in the frons is sufficiently noticeable.

Genus **LEPIDANTHRAX**, *O.-S.*

Lepidanthrax, Osten-Sacken, Biol. Cent.-Amer., Dipt. i, p. 107 (1886).

GENOTYPE, *Anthrax disjuncta*, Wied.; by designation of Coquillett (1910).

"Antennæ widely separated at base, inserted quite near the orbits; 3rd joint short, onion-shaped, with a long filiform style, undivided by a suture, and with a microscopic bristle at the tip. Front comparatively broad in both sexes; proboscis considerably prolonged beyond oral margin, slender. Front tibiæ with a series of distinct spinules on upperside, front tarsi varying in structure, stout or slender, always with distinct joints; the minute hairs and bristles of the underside distinctly differentiated from those of the upper; no pulvilli, ungues without teeth. The contact of the 4th posterior cell with the discal cell unusually long, about as long as the 3rd vein issuing from the discal cell; the distal end of the discal cell is not expanded, its sides being more or less parallel; anal cell open. The sides of the abdomen are fringed, not with hairs only but with real scales.

"*Lepidanthrax* will be easily recognised from the genus *Anthrax*, not only by the general appearance and colouring, but by its long proboscis, the more distinct spinules on the front tibiæ, and the venation." (*Osten-Sacken.*)

The exact generic characters as set up by Osten-Sacken are quoted, but those of the antennal 3rd joint and the base of the 4th posterior cell appear variable. The first species referred here to *Lepidanthrax* possesses a considerably elongate 3rd antennal joint, with a moderate-sized style ending in a nearly transparent microscopic stumpy thick bristle. In all other characters *compacta* fulfils the generic requirements. In the second species the 3rd joint and its style are nearly normal. I have not examined the pubescence of the front tarsi, as being of little value, but the comparatively elongate proboscis and the slight though distinct difference of venation will distinguish the species. The proboscis reaches forwards (in the ♂ specimen) as far as the tip of the face, or downwards (in the ♀ specimen) to a distance equal to the height of the head. The face is considerably produced, and the contact of the 4th posterior cell with the discal is very nearly equal to that of the 3rd, whereas in all Indian species of *Anthrax* it is never more than half that length, often $\frac{1}{3}$ or $\frac{1}{4}$ only. In *L. transversa* this generic difference is less pronounced. The species of *Lepidanthrax* known previously come from Central America.

The two Indian species may be differentiated thus :—

Third abdominal segment with band of whitish scales; base of wing more or less infuscated, sometimes up to anterior cross-vein .	*compacta*, sp. n.
Whole abdomen without whitish scales; wing clear, except the yellowish subcostal cell	*transversa*, sp. n.

180. **Lepidanthrax compacta**, sp. nov.

♂ ♀ *Head* of ♂ with frons half as wide at vertex as at level of antennæ, where it forms rather more than one-fourth of the head, (apparently) dark brownish grey, covered with yellowish-grey scales, with which some fine black hairs are intermixed; face similarly clothed; mouth-opening very large, with some golden-grey hairs round anterior margin; proboscis dark brown, with long yellow bristles at tip; antennæ black, first two joints very bristly; occiput blackish, with small yellowish-grey scales. In ♀, frons rather broader at vertex, and forming nearly one-third of head at level of antennæ. *Thorax* blackish, with very short, yellowish-grey, flat-lying scales on dorsum, and with brownish-yellow or yellowish elongate scaly pubescence on anterior margin and towards sides; the usual fan-shaped bunches of similar structure below shoulders and below hind corners of dorsum; some light yellowish pubescence on pleuræ; scutellum with yellowish-grey scales and some black bristles on hind margin. *Abdomen* blackish, covered with short yellowish-grey depressed scales; those at base of 3rd and towards sides at bases of 5th and 6th segments are whitish; on 7th segment they are longer and almost silvery; some sparse soft brown hairs on abdominal dorsum and stiffer ones on hind margins of segments; venter blackish, covered with short yellow scales and hairs. *Legs* black, tibiæ brown; hind legs with rather broad, very thin, short, yellowish-white (♂) or yellow (♀) overlapping scales covering entire surface, except underside of tarsi, giving in the ♀ a distinct yellow colour to the legs. *Wings* clear, costal and subcostal cells and extreme base of wing yellowish brown; halteres pale yellow.

Length, 5–7 mm.

Described from a few specimens in the Indian Museum and Pusa collections from Allahabad, 26. iii. 1906 (type ♂), 10. iv. 1906 (type ♀), 14. x. 1905 (*Howlett*).

Type ♂ and ♀ sent to British Museum.

181. **Lepidanthrax transversa**, sp. nov.

? ♀. General characters as in *L. compacta*. *Head*: frons gradually widening from vertex to level of antennæ, where it is rather narrower than in *compacta*; covered with small yellowish depressed scales and erect black pubescence; face covered with dense elongate pale yellowish scales, no black bristles; 3rd antennal joint short onion-shaped, black, with long black style; proboscis lying along mouth-opening, but apparently long enough to project as far as in *compacta* if pointed forwards; occiput black, with small white scales around eye-margins and yellowish scales in the middle. *Thorax* as in *compacta*. *Abdomen* with a broad basal band of small depressed yellowish scales on each segment except the 1st; rest of dorsal surface with depressed dull black scales; posterior margins of 5th and 6th segments

with black bristles; latter also with a fringe of yellowish scales, which become white at their tips; 7th segment covered with yellowish scales and black bristles, hind border with a dense fringe of long snow-white scales; venter black, wholly covered with small pale yellowish scales. *Legs* black; femora and tibiæ covered with yellowish scales, middle tibiæ brownish yellow; tarsi black, joints distinct. *Wings* quite clear, vitreous, subcostal cell brownish yellow; base of 3rd posterior cell more sinuous than in *compacta*; halteres chalk-white.

Length, 9 mm.

One specimen (? ♀) in the British Museum from Dehra Dun, Western Himalayas, 1907 (*Lt.-Col. Wyville Thomson*).

Genus **ANTHRAX**, *Scop.*

Anthrax, Scopoli, Ent. Carn. p. 358 (1763); Brunetti, Rec. Ind. Mus. ii, pp. 451, 455 (1909).
Villa, Lioy, Atti Istit. Veneto, (3) ix, p. 732 (1864).
Hemipenthes, Loew, Berl. Ent. Zeits. xiii, p. 28, note (1869).
Dipalta, Osten-Sacken, Bull. U.S. Geol. Surv. iii, p. 236 (1877).
Chrysanthrax, Osten-Sacken, Biol. Cent.-Amer., Dipt. i, p. 121 (1886).
Isopenthes, Osten-Sacken, *op. cit.* pp. 80, 96.
Pœcilanthrax, Osten-Sacken, *op. cit.* p. 119.
Stonyx, Osten-Sacken, *op. cit.* pp. 80, 94.
Thyridanthrax, Osten-Sacken, *op. cit.* p. 123.
Hyalanthrax, Osten-Sacken, *op. cit.* p. 134 (1877).
Aspiloptera, Künckel, Bull. Sci. France et Belg. xxxix, p. 145, note (1905).
? *Paranthrax*, Bigot, Bull. Soc. Ent. France, (5) vi, p. lxvi (1876).

GENOTYPE, *Anthrax morio*, F.; by Rondani's designation.

Head semicircular, inflated behind, but slightly inarched at the middle, as broad as or a little broader than thorax; face very short, sometimes conically projecting or gently convex; proboscis short, withdrawn into the large mouth-opening, labella rather broad; palpi small, thin, cylindrical, apparently one-jointed; three ocelli; eyes in both sexes wide apart; frons rather narrower in ♂, an indentation at middle of hind margin in both sexes. Antennæ porrect, short, wide apart at base; 1st joint short, cylindrical; 2nd cup-shaped; 3rd varying from elongate conical to flattened onion-shaped, with an apical microscopic bristle, never with an apical pencil of hairs. *Thorax* quadrate, with rounded angles, broadest behind, with indistinct præsutural but distinct postalar bristles. Scutellum broad, short, bare of bristles; metanotum concealed. *Abdomen* flat, oblong, longer than thorax, 7-segmented. Genitalia small, mainly concealed, placed asymmetrically; ovipositor with a circlet of short blunt spines. *Legs* moderately long, hind pair lengthened and often bearing conspicuous scaly pubescence; all femora and tibiæ with short scaly pubescence in some species; fore tibiæ sometimes quite bare, sometimes with small spicules; posterior tibiæ with

an apical circlet of spines; fore tarsi variable in shape and pubescence; front claws varying in size; pulvilli very small or absent, occasionally well developed. *Wings* when at rest half open. Venation as in the other Anthracine genera; only two submarginal cells; 3rd vein sometimes with a short appendix at its fork; 2nd vein not infrequently with a recurrent veinlet at its rectangular bend; both 2nd vein and upper branch of 3rd often sinuous and parallel towards their tips. A prealar hook near base of wing, generally hidden by the pubescence.

Range. World-wide; a very extensive genus.

Life-history. Larva amphipneustic, 13-segmented, nearly cylindrical, a little flattened below, tapering at each end. Several European and North American species have been bred from Lepidopterous larvæ, and one from the egg-cases of a locust, others being known to live in the cocoons of Hymenoptera. "In cases where the *Anthrax* larva lives in other larvæ these latter pupate before they are destroyed, and the *Anthrax* larva lies in the pupa of its host" (*Lundbeck*). The imagos occur in sandy or dry districts, bare open spots and pathways; their flight is short but swift.

Several subgenera of *Anthrax* were suggested by Osten-Sacken, founded primarily on the wing-markings: *Thyridanthrax* for species with brown wings with more or less hyaline spots; *Anthrax* (*s. str.*) for those with clear wings, except for a broad baso-costal dark band; *Hyalanthrax* for those with practically wholly clear wings or at most an infuscated costal margin; and one or two others. It was urged that these characters were supported by others, and also by the fact that the species of each group were parasitic on a totally different group, or even order, of insects. As, however, intermediate forms are sure to occur, and the subgenera have not been adopted by subsequent authors, they are herein ignored. So far as the Indian species go, *fletcheri* and *guttatipennis* belong to a group with wholly dark wings; *afra*, *semifuscata*, and *himalayanus* would fall in *Anthrax* (*s. s.*); whilst all the others belong to *Hyalanthrax*.

Table of Species.

1. Anal cell closed ..	*clausa*, Brun., p. 253.
Anal cell open	2.
2. Wings nearly wholly dark brown....	3.
Wings always with an appreciable clear part	4.
3. No clearer spots in any of the wing-cells.	*fletcheri*, sp. n., p. 236.
Clearer spots on basal half of wing	*guttatipennis*, sp. n., p. 237.
4. A distinct oblique baso-costal wing-band	5.
No such distinct band; costa generally narrowly, dark, light brown, or yellowish, the colour not extending behind anterior cross-vein (normally); or wings practically clear	7.

5. Hind margin of wing-band nearly straight	6.
Hind margin of wing-band with deep indentations	*himalayanus*, Brun., p. 238.
6. Wing-band filling less than ⅓ of the wing; hind margin clear cut .	*afra*, F., p. 240.
Wing-band filling fully half the wing; hind margin indistinct	*semifuscata*, sp. n., p. 241.
7. Legs mainly yellow.	8.
Legs all black	9.
8. Femora with a considerable part black; wings practically clear..	*albofulva*, Walk., p. 251.
Femora all yellowish; basal half of wings brownish..... .. .	*aureohirta*, Brun., p. 252.
9. Abdomen uniformly densely pubescent, without obvious transverse bands of scales	10.
Abdomen with transverse bands of yellowish, grey, or white scales; pubescence sparser	11.
10. Wing with deep brownish-black costa; larger species, 14–16 mm. ..	*manifesta*, Walk., p. 242.
Wing less extensively brown; smaller species, 10½–11 mm.	*clara*, Walk., p. 243.
11. Pubescence on sides of abdomen wholly snow-white, except for few bunches of scales on each side near tip	*aperta*, Walk., p. 245.
Pubescence on sides of abdomen never as wholly white as in *aperta*, generally yellowish grey or black and white, and not arranged as in *aperta*.	12.
12. Ground-colour of abdomen or tomentum (apparently) reddish brown.	*dia*, Wied., p. 250.
Ground-colour of abdomen black	13.
13. Costal cell yellowish	*baluchianus*, sp. n., p. 250.
Costal cell lighter or darker brown*..	*hottentotta* var. *claripennis*, Brun., p. 247. *paniscus*, Rossi, p. 248. *fuscolimbata*, Brun., p. 246. *approximata*, Brun., p. 244.

Four species that appear to require confirmation as Indian are not included in this table, but descriptions are appended (pp. 254, 255).

182. **Anthrax fletcheri**, sp. nov.

♂ *Head* black; frons at level of antennæ between one-third and one-fourth width of head, less than half this width at vertex; frons and face (apparently) covered with bright chrome-yellow

* These species are too closely allied to be satisfactorily differentiated in tabular form.

small impressed scales, with the addition of black hairs on the former: antennæ all black; apical end of proboscis brown; occiput (apparently) with minute yellow impressed scales and very short concolorous pubescence; a fringe of such pubescence on hind margin of occiput. *Thorax* black, with small bright chrome-yellow impressed scales on dorsum and with bright concolorous long scaly pubescence on anterior and side margins and on pleuræ, where it is a little paler below shoulders and wings. Scutellum black (denuded), apparently with small yellow scales as on thorax and a row of black bristles on hind margin. *Abdomen* black, surface apparently covered with minute black impressed scales, which are longest on the 2nd segment; an upper clothing of bright yellow small impressed scales; sides of first four segments with bunches of concolorous elongate scales; sides of 5th and most of the sides of the 6th with elongate black scales, hind part of sides of 6th with bright yellow elongate scales; 7th segment with elongate black scales on hind margin. Venter black, with minute black scales; some fine yellow hairs at base and small yellow scales on hind margins of most of the segments. *Legs* black; coxæ with some fine yellow hairs; femora and tibiæ with traces of small yellow scales (mostly denuded) and the usual black bristles; middle femora with some pale fine hairs on inner side. *Wings* wholly dark brown, the anterior part still darker; anterior cross-vein distinctly before middle of discal cell; anal cell narrowly open; halteres creamy yellow.

Length, 12 mm.

Described from a unique ♂ from Mysore, 4400 ft., 25. iii.–29. v., sent for examination by Mr. T. Bainbrigge Fletcher, and presented by him to the British Museum.

183. **Anthrax guttatipennis**, sp. nov.

Head: frons at level of antennæ one-third width of the head, diminishing to one-third as wide at vertex, black, covered (apparently), as is the face also, with bright chrome-yellow elongate scaly pubescence, intermixed (at least on frons) with long black hairs; antennæ black, 1st joint bristly, 3rd short onion-shaped, with long style; occiput black, with minute greyish-white scales on eye-margins. *Thorax* black (denuded), with bright chrome-yellow scaly pubescence forming a collar and towards sides of dorsum, covering shoulders and extending over pleura; scutellum black, with minute bright yellow scales on posterior margin and some concolorous bristles, with which are mixed some long black ones. *Abdomen* black; 1st segment with a little ragged bright yellow bristly pubescence; all segments except 4th* with broad basal bands of depressed small bright yellow scales, the bands narrowest at the centre of each segment; rest of dorsal surface apparently covered with depressed small

* Possibly an individual aberration.

dull black scales; a few long black bristles on hind margins of at least last two segments; sides of first four segments with long shaggy bright yellow scaly pubescence; venter black, basal half covered with small depressed bright yellow scales and somewhat longer concolorous pubescence, and apparently two or more narrow transverse rows of similar scales on apical half. *Legs* black; coxæ with long yellowish hairs and black bristles at tip, directed backwards; femora, at least on hinder side, with minute pale yellowish adpressed scales and a few black bristles below; tibiæ with some yellow scales on hinder side, rest of surface with closely-impressed, very dark brown scales and the usual bristles; tarsi black. *Wings* dark brown, darker anteriorly; centre of both basal cells, discal cell, and 3rd and 4th posterior cells narrowly pale; a small elongate pale streak in marginal cell just before bifurcation of præfurca, and another towards tip of that cell; two similar streaks in 1st submarginal cell; halteres yellowish.

Length, 13 mm.

Described from a unique specimen (sex uncertain) in the British Museum from Trincomali Hot Wells, Ceylon, 15. x. 1891 (*Yerbury*).

184. **Anthrax himalayanus**, *Brun.*

Anthrax himalayanus, Brunetti, Rec. Ind. Mus. ii, p. 222, figs. 1, 2 (1909).
Anthrax maura, Brunetti, *op. cit.* ii, p. 451 (1909).

♂ ♀ *Head* black; frons in ♂ and ♀ fully or over one-third width of the head at level of antennæ, between one-third and one-fourth this width at vertex in ♂ and about two-fifths in ♀; frons and face with prominent long black pubescence and minute elongate yellow scales, which latter are rather longer on face, where there are also a few yellow hairs; antennæ black, 3rd joint short onion-shaped, with a long style; proboscis black, withdrawn; occiput black, with minute yellowish-white scales. *Thorax* black, with rather long, fine, very dark brown hairs; the surface apparently sparsely covered with minute depressed elongate yellow scales; anterior margin with a row or fringe of long brownish-yellow scales; side margins with long, pale yellow, almost scale-like pubescence. Sides of thorax light grey, with elongate brownish-yellow scales and concolorous pubescence on lower part; an elongate bunch of long black scales below shoulders and a fringe of similar scales in the centre of the lower anterior margin, immediately below head, with elongate brownish-yellow scales on each side. Scutellum black, with minute orange-yellow depressed scales on dorsum and with fine black hairs; a row of black bristles on hind margin. *Abdomen* black; 1st segment with some long yellowish-grey scaly pubescence towards sides, which stretches across the anterior margin also, posterior margin with a

narrow row of minute orange-yellow (varying to yellowish-grey) scales; surface of 2nd and 3rd segments, posterior half of 4th, hind margins, and more or less of the dorsum of 5th, 6th, and 7th with minute reddish-yellow depressed scales; anterior half of 4th segment occupied by a transverse band of whitish scales; hind margins towards the sides of 6th and 7th segments with similarly coloured scales. Whole surface of abdomen with fine long black pubescence, there being apparently no row of bristles on hind margins of any of the segments; sides of 1st, anterior half of 2nd, and all the 4th with white scaly pubescence; hind half of 2nd and all the 3rd, 5th, and 6th with black scaly pubescence. Venter rather light grey, with minute yellow scale-like depressed hairs and long fine black pubescence, with longer more bristly black hairs towards tip; genitalia blackish, tip brown. *Legs* dark brown; fore coxæ with a few fine yellow hairs, hind pair with black hairs: femora with minute depressed yellowish-white scales; tibiæ with similar but apparently less numerous scales; some fine black hairs on underside of femora; femora and tibiæ with the usual rows of bristles; tarsi blackish. *Wings* very pale grey, with a broad deep brown baso-costal band occupying about half the surface; the colour extending along all the costa to tip of upper branch of 3rd vein; posteriorly the colour filling axillary and anal cells except their tips, nearly half the 4th posterior cell, less than a third of the 3rd posterior cell, and basal half of discal cell; a downward extension (blob) stretching across the 1st posterior cell and filling half of the 2nd posterior cell, the colour limited by the outer side of the discal cell; the colour also fills the basal half of the 1st submarginal cell and the whole of the marginal cell, except a small space in a line with the proximal limit of the clear half of the marginal cell; a small oval sub-hyaline spot in upper corner of 1st basal cell, with a narrow longitudinal (not transverse, as I erroneously noted in my first description of the species) streak above it.*

Length, 7-11 mm.

Described from three ♂ ♂ and three ♀ ♀ in the Indian Museum, Kufri to Phagu, 18. v. 1916; Phagu, Simla Distr., 9000 ft., 12. v. 1909, *type* ♂; Simla, 7000 ft,, 16. v. 1909, *type* ♀ (both *Annandale*); two ♂ ♂, Naini Tal, v–vi. 1893 (Lucknow Museum); two ♀ ♀, Simla, 16. v. 1909 and 9. v. 1910, on the flowers of the white stonecrop (*Annandale*); Khasi Hills, Assam (Brit. Mus.).

This species is very close to *A. maura*, L., of Europe, and was referred to under that name in my first paper on this family (*l. c.*). I have already detailed the differences between the two species (Rec. Ind. Mus. iii, p. 222).

* A more rough-and-ready description of the wing would be: antero-proximal half dark brown, the colour cutting the 4th posterior and discal cells about their middles; a large blob from the dark part at two-thirds the wing-length reaching nearly to the hind margin, a similar smaller blob filling the curve in the 2nd longitudinal vein, and a minute 3rd blob between the 2nd one and tip of upper branch of 3rd longitudinal vein.

185. Anthrax afra, *F.*

Anthrax afra, Fabricius, Ent. Syst. iv, p. 258 (1794); Schiner, Fauna Austr. i, p. 50 (1862); Brunetti, Rec. Ind. Mus. ii, p. 451 (1909).

Anthrax fimbriatus, Meigen, Klass. i, p. 205 (1804); id., Syst. Besch. ii, p. 154, pl. xvii, fig. 13 (1820).

♂ ♀ *Head*: frons one-third as wide at vertex as at level of antennæ, where it forms one-third the width of the head, dark olive-brown or blackish, with black hairs and small elongate yellow scales; ocelli pale, ocellar tubercle quite clear of eye-margins; face clothed as frons; eyes dark brown; antennæ black, 2nd joint often dull red, 1st joint with long, 2nd with short black bristles; proboscis marked with blackish brown; occiput black, with very small yellow scales and minute white scaly pubescence in centre and around upper half of margin. *Thorax* from dark olive-brown to blackish, more or less covered on upper surface with very small yellow flat-lying scales; towards the sides with from pale yellow to brownish-yellow bristly pubescence, which on anterior margin changes to very narrow elongate yellow bristle-like scales, a large fan-shaped bunch of which (of deeper yellow) occurs below the shoulders, extending nearly to the wing-base; on the shoulders and extending posteriorly for a short distance the scales are often yellowish white and nearly silky in nature; on the posterior calli a large fan-shaped bunch of bright yellow elongate bristle-like scales, with some whitish ones in front of them. Sides of thorax with some black hairs and apparently a few yellow hairs around wing-base; scutellum with short flat-lying yellow scales and a row of long black bristles towards hind margin. Thorax with usual macrochætæ. *Abdomen* black, 1st segment with small yellow and white scales intermixed; anterior half of 3rd and 6th segments with small white scales; most of the 2nd segment and a band on hinder part of 3rd to 6th segments, yellow-scaled; rest of dorsal surface with black scales; the 7th segment bears white and black scales, and there is a large fan-shaped bunch of very elongate milk-white scales on anterior corners of abdomen. Genitalia with a circlet of reddish-yellow spines; venter mainly with black scales and a few long pale hairs, a narrow row of small yellow scales on hind borders of segments. *Legs* black or dark brown; femora with small, dark-brown, closely-applied scales and others that reflect a greyish lustre in certain lights; fore femora with a few stiff, moderately long hairs below, hind pair with a row of moderate-sized bristles below; anterior tibiæ with short pubescence, hind pair with dark brown and greyish-lustred scales and rows of small black bristles; tarsi blackish. *Wings* clear; a dark brown oblique band on anterior margin extending nearly to tip of costal cell and defined posteriorly by a line drawn, with slight angulations at the veins, from that spot diagonally to the base, cutting the anal cell at one-third of its length; halteres yellow.

Length, 4½–7 mm.

Described from a good number of specimens in the Indian Museum, Pusa, my own, and other collections. A widely distributed species in India: Dehra Dun, iv. and ix. 1904 (*Chatterjee*); Anamalai Hills, 4000 ft., 24. i. 1912 (*Fletcher*); Allahabad, 24–29. iii. 1906, 6 and 19. x. 1905 (*Howlett*); Satara Distr., 3200 ft., Bombay, 23. iv. 1912 (*Gravely*); Puri, 24–28. i. 1911 (*Annandale, Gravely*), 29. ii. 1908 and 2. iii. 1908 (*Paiva*); Gonda Distr., United Prov., 26. ii. 1907, 9. iii. 1909; Madhupur, Bengal, 14. x. 1909; Pusa, common, ii, iii, iv, vi, xi; Pipera, Gonda Distr., United Prov., 9. iii. 1909 (*Hodgart*); Muttra, 22. iv. 1905; Meerut, 25. iv. 1905; Ferozepore, 28. iv. 1905 (all *Brunetti*); Guindy, Madras (*Capt. Cragg*); Dawna Hills, Burma, 2000–3000 ft., 2–3. iii. 1908 (*Annandale*); Trincomali, Ceylon, 21. viii. 1890 (*Col. Yerbury*); Port Blair, Andaman Is., 15. ii. to 15. iii. 1915 (*Kemp*).

186. **Anthrax semifuscata**, sp. nov.

♂ ♀ *Head*: frons at level of antennæ less than one-third width of the head, at vertex less than half this width, blackish grey, with minute bright yellow scaly pubescence, which latter also covers the face; antennæ black, 3rd joint short, with long style; occiput blackish grey, a fringe of small snow-white scales on lateral eye-margins. *Thorax* black (denuded), hind corners of dorsum dull reddish brown; in good specimens the dorsum, anterior margin, and sides of thorax are probably covered with bright chrome-yellow scaly pubescence, which extends to the scutellum also. *Abdomen* black; 1st segment with a band of depressed bright yellow scales; 2nd, 3rd, 4th, and 6th segments each with a basal band of similar scales, broadening towards and at the sides, where it is augmented by concolorous long scaly pubescence covering all the sides of the 2nd, 3rd, and 4th segments; 5th segment apparently devoid of such a band; dorsal surface of abdomen not covered by yellow scales, furnished with small depressed black scales; venter black, basal half with depressed bright yellow scales, concolorous scales about the tip. *Legs* black; femora with whitish scales on hinder side (those on fore pair appear more yellowish); tibiæ with some yellowish-white scales; tarsi black. *Wings* pale grey, basal and anterior parts moderately dark brown, the colour fading away distally, its approximate limit running from tip of 1st vein, just escaping fork of 3rd vein, filling discal cell and bases of 3rd and 4th posterior cells and filling anal and auxiliary cells; halteres pale yellow.

Length, 7–8 mm.

Described from three specimens in indifferent condition in the British Museum from Trincomali, Ceylon, 2. x. 1890 (type a ♂), 9 and 15. x. 1890 (*Col. Yerbury*).

Although not one of the three specimens is in good condition, the species is a quite a well-marked one by the extent of infuscation of the wing. A noticeable point is the variability in the exact position of the bifurcation of the præfurca.

187. **Anthrax manifesta**, *Walk.*

Anthrax manifesta, Walker, Ins. Saund., Dipt. pt. 3, p. 178 (1852).

♂ ♀ *Head*: frontal sexual differences as in *A. aperta*; frons at level of antennæ forming one-third the width of the head, black, with dense short stiff black hairs, which become denser round base of antennæ and are continued along the middle of the face; frons also with very small recumbent hair-like bright yellow scales; face, except just below antennæ, covered with bright chrome-yellow or orange-yellow elongated scales, intermixed with yellow hairs. Antennæ black, 1st joint broader at tip, with long black bristles on outer and inner sides and yellow hairs below; 2nd and 3rd joints normal; proboscis blackish; occiput black, upper margin with very small whitish scales, centre with short yellowish pubescence. *Thorax* black, dorsum with soft dark brown hairs, and some small yellow scales about middle of hind margin, opposite which are some dead-black thin scales on the scutellum. Anterior border, shoulders, and sides of thorax with long dense chrome-yellow or orange bristly, almost scale-like pubescence, which becomes paler or sometimes even whitish on underside; fan-shaped brushes of this pubescence occur as in *A. aperta*. *Abdomen* black; base of first four segments with small short flat-lying bright yellow scales, thickest on 2nd and 4th segments; 5th and remaining segments with longer similar scales; the rest of the dorsal surface with small dead-black flat-lying scales and sparse long black or brown hairs. Sides of abdomen with dense scale-like bristly pubescence or very thin real scales, this vestiture varying from deep orange to yellowish in different specimens, and being, generally speaking, deeper coloured on anterior half and paler, sometimes whitish, on hinder half of abdomen; sides of 5th and 6th segments with elongate dark brown scales and longer dark brown or blackish thick bristly pubescence. Venter black, covered with small bright yellow scales and sparse fine yellow hairs, both scales and hairs longer and denser towards tip; hind margin of last segment with elongate dark brown scales. *Legs* scaled as in *A. aperta*; femora with soft yellow hairs below; hind tibiæ with numerous dark brown or black elongate scales, intermixed with black spines and some smaller yellow scales, which latter appear to occur more or less on the middle tibiæ also and to cover most of the femora. *Wings* pale grey; costal and subcostal cells dark brown, the colour extending in diminishing intensity into the marginal and filling the 1st basal cell; halteres dull yellowish, variable; squamæ brownish, with a fringe of elongate orange or yellowish scales.

Length, 14–16 mm.

Redescribed from two ♂ ♂ and three ♀ ♀ from Mussoorie, ix. 1906; Jhajjur, Kashmir, 22.xi.1911; Simla, 26.v.1914 (*Capt. Evans*); Lower Ranges, Khasi Hills, 1878 (*Chennell*).

Type in the British Museum.

188. **Anthrax clara**, *Walk.*

Anthrax clara, Walker, Ins. Saund., Dipt. pt. 3, p. 179 (1852); Brunetti, Rec. Ind. Mus. ii, p. 452 (1909).

♂ ♀ *Head*: frons in ♂ six times, in ♀ three times as wide at level of antennæ (where it forms nearly one-third the width of the head) as at vertex, black, and, as is also the face, covered thickly with dense erect stiff black pubescence, amidst which numerous small bright yellow depressed scales are visible, more numerous on the face, where they are intermixed with yellow hairs; antennæ black, 3rd joint moderately elongate, with rather long style; mouth-parts reddish brown or blackish; hind margin of eyes with a narrow fringe of small white impressed scales, which perhaps may extend over most of the occiput. *Thorax* black, dorsum covered with minute bright yellow impressed scales, either placed on top of (forming an upper layer) or intermixed with similar dull black scales;* fine long black hairs are scattered irregularly over the dorsum; margins of dorsum with thick bright yellow scaly pubescence, a few black bristles at sides in front of wings and three or four brownish-yellow spines on posterior corners, directed backwards. Scutellum like thoracic dorsum; hind margin with a row of long yellow hairs and (apparently) some yellow bristles and some elongate black scales. *Abdomen*: integument between thorax and abdomen whitish grey; dorsum of abdomen black, mainly (or entirely?) covered with very small impressed black scales, and apparently the greater part covered in good specimens with small yellow scales; margins of dorsum and sides of abdomen with dense long fine scaly pubescence, the dorsum covered more thinly, though, when viewed at a low angle from behind that part, it appears almost as thickly covered as the sides; this pubescence is rather darker yellow in the ♀; on hinder part of dorsum in ♀ the pubescence is black. Hind margin of 6th segment narrowly, and basal three-fourths of 7th, with yellow scales; remainder of 7th with black scales; sides of 5th and 6th segments with thick bristly black pubescence; ground-colour of side margins of first three segments in ♂ yellowish; venter black, with minute black and yellow impressed scales and some fine yellow pubescence. *Legs* black; femora with closely-placed small black scales, which in certain lights have a greyish tinge; small yellow scales also present; tibiæ and tarsi with small black scales and bristles. *Wings* practically clear; costal and subcostal cells dark brown, the colour extending irregularly over præfurca and also at extreme base proximad to basal cells; anterior cross-vein just before middle (♂) or at first 3rd (♀) of the discal cell; halteres pale yellow.

Length, 10½–11 mm.

Redescribed from a ♂ from Majkhali, Western Himalayas,

* The dorsum of the ♂ specimen is mainly denuded, that of the ♀ partly so, but probably a double covering of scales is present in perfect specimens.

6000 ft., 4. x. 1907, and a ♀ from Naini Tal, 6300 ft., 11. v. 1911 (*Kemp*), both in rather inferior condition but with all the characters fairly obvious, and both in the Indian Museum, as are also two others—one named by Bigot from Dehra Dun, the other from the Garhwal Distr., 21. x. 1907. These two specimens have been compared by Mr. F. W Edwards with the types in the British Museum, where the species also figures from Dehra Dun, xi. 1907 (*Lt.-Col. Wyville Thomson*), and the Khasi Hills, Assam. *Type* in the British Museum.

189. **Anthrax approximata,** *Brun.*

Anthrax approximata, Brunetti, Rec. Ind. Mus. xiii, p. 74 (1917).

♀ This species is very close to *A. clara*, Walk., yet certainly distinct. The scales on the frons and face vary from yellow to snow-white, in one specimen only being yellow on both parts, in others yellow on frons and white on face, those of the latter colour encroaching to some extent on lower part of frons ; in one example snow-white on practically the whole of both frons and face ; sometimes some yellow scales around the mouth-parts amidst the white ones. Abdomen not uniformly pubescent, as is probably the case in *clara*, but with distinct transverse bands of yellow or whitish scales at base of segments, those on the 2nd and 4th being widest, extending on the former segment nearly to the middle, and on the latter much further, especially towards the sides ; hind borders of 6th segment with conspicuous snow-white scales and a large bunch of longer ones on about the hinder half of each side ; sides of 5th segment and anterior half or more of 6th with long very dark blackish-brown scales ; dorsum of abdomen, except for the transverse bands, with black scales, wholly covered with soft fine pubescence, and with a row of black bristles on hind borders of 5th, 6th, and 7th segments, becoming stronger on each successive segment ; a row of fine yellow hairs before the hind border on first four segments and a few fine yellow hairs on dorsum of basal segments. Costal cell clear or faintly obscured ; subcostal cell dark brown, the colour not extending further hindwards ; anterior cross-vein a little before middle of discal cell, the exact position apparently rather variable. In all else as in *A. clara*.

Described from five ♂ ♂ in the Indian Museum : Simla, 7000–8000 ft., 28. v. 1914, type (*Capt. Evans*), and 16. v. 1909 ; Siliguri, base of Darjiling Hills, 28. iii. 1910 ; Dawna Hills, Tenasserim, 2000-3000 ft., 2–3. iii. 1908 ; Kawkareik, Amherst Distr., Tenasserim, 5. iii. 1908,* and 23. iii. 1910 (*Annandale*). In the British Museum from Khasi Hills, 1878 (*Chennell*) ; Trincomali, Ceylon, 12. x. 1890, 12. xi. 1890 (*Col. Yerbury*) ; Nilaveli, Ceylon, 19. vii. 1891 (*Col. Yerbury*).

* Erroneously quoted as 5. ii. 1908 in Rec. Ind. Mus. ii, p. 474.

The two specimens alluded to by me in my first paper on BOMBYLIIDÆ as allied to *A. clara*, Walk., are amongst those now referred to *approximata*.

190. **Anthrax aperta**, *Walk.*

Anthrax aperta, Walker, Ins. Saund., Dipt. pt. 3, p. 180 (1852).

♂ ♀ *Head*: frons in ♂ sufficiently narrow at vertex for the small ocellar tubercle to touch the eye on each side, in ♀ broad enough for this tubercle to be quite clear of the eyes; in both sexes frons broadening to base of antennæ, where it forms one-third of the head, black, covered wholly with black bristles and on the lower part with elongate black or dark brown scales and some shorter yellow or yellowish-white scales intermixed; face in ♂ wholly and thickly covered with elongate bright yellow scales, with which are intermixed long black hairs, and in the median line from base of antennæ to mouth-opening a stripe of dark brown scales; in ♀ the face-scales mostly whitish, those in the median line yellowish; eye-facets small, uniform; antennæ black, 1st and 2nd joints bristly, 3rd onion-shaped, produced into a long bare style. *Thorax* black, covered with moderately short blackish-brown hairs; anterior margin with a thick fringe of reddish-tawny bristly hairs, which extend to a considerable portion of the underside. Sides of thorax with long whitish-grey scale-like pubescence, forming fan-shaped bunches about the humeral and posterior calli, near the wing-base and on the pleuræ; this pubescence varies from nearly white to dirty grey and yellowish. Along the hind border of the mesonotum there is always, in the narrow depression occurring just before the extreme margin, a row of very small flat-lying bright yellow scales.* Scutellum black, with some soft black hairs and (probably) with whitish pubescence.† *Abdomen* black; at base of 2nd segment a moderately wide band of very small flat-lying white scales; a similar but narrower band of yellow scales at base of 3rd segment and a row of yellowish or whitish (or apparently both intermixed) at base of remaining segments; rest of surface covered with small flat-lying black scales; entire dorsum covered with rather long fine dark brown hairs, which along the basal bands of pale scales appear to be replaced by whitish ones. Sides of abdomen thickly clothed on first two segments with long bushy scale-like whitish hairs; on 3rd segment with long very dark brown scales and hairs, which extend a little over the sides of the 2nd segment; on 4th segment with elongate white scales, connected with the basal cross-band

* A few of these generally remain even in badly-denuded specimens, but there seems no reason to infer that they extend beyond the narrow space described.

† This is conjecture, not one of the specimens before me bearing any pubescence.

of whitish scales (which, after those on the 2nd segment, are the most conspicuous of these transverse scale-bands); on 5th and 6th segments with elongate dark brown scales and hairs; and on the 7th segment with white scales. This vestiture of the sides of the abdomen is quite distinct from the dorsal, and of much finer pubescence. Genitalia dark brown or blackish, with some fine black hairs. Venter black, with flat-lying dull black scales and sparse black hairs; hind margins of segments with a more or less broad border of whitish or yellowish scales. *Legs* black; coxæ with long yellowish-grey hairs; femora with closely-placed very dark brown scales and a further clothing on underside of yellowish-white scales, also with some long fine hairs; tibiæ with very short bristles, hind pair with short but distinct very dark brown scales. *Wings* quite clear; base of costa with thick dark brown scales, over which lies a covering of elongate silvery snow-white scales; costal cell dark brown up to humeral cross-vein; subcostal cell wholly brown, the brown colour also extending very narrowly across the wing at the extreme base; halteres dull pale yellow.

Length, 8–14 mm.

Redescribed from several specimens from both Mussoorie, ix. 1906, and Simla, 16. v. 1909 (*Annandale*); Simla, x. 1911; Dehra Dun, xi. 1907 (*Lt.-Col Wyville Thomson*); Sukli, Dawna Hills, 2100 ft., 22–29. xi. 1911 (*Gravely*); Khasi Hills. Found on *Sedum* and the common marguerite.

Type in the British Museum.

This species is fully redescribed here from four ♂ ♂ and five ♀ ♀, mostly in tolerably good condition, and this must supersede my former description, drawn up from a single specimen.

191. **Anthrax fuscolimbata**, *Brun.*

Anthrax fuscolimbata, Brunetti, Rec. Ind. Mus. xiii, p. 75 (1917).

♀ *Head*: frons one-third width of head at level of antennæ, less than half this width at vertex, covered with yellowish impressed scales and black pubescence, the scales near the antennæ sometimes becoming gradually whitish; on face all snow-white in type, and yellowish white and yellowish respectively in the other two specimens; antennæ black, 1st joint with long black bristles, 2nd with a ring of shorter bristles, 3rd elongate conical, tapering to a rather long style; proboscis dull yellowish or obscure; occiput with a border of snow-white minute scaly pubescence behind eyes, and some yellow scales on upper part. *Thorax* black, more or less covered with small impressed yellow scales; anterior and side margins, shoulders, and pleuræ covered with dense elongate brownish-yellow scales, which are paler on the mesopleura and sternopleura or sometimes altogether paler; a rather short fine sparse black pubescence on dorsum, sometimes remaining after nearly all the yellow scales have been worn off. Scutellum black, with small yellow impressed scales; a few fine yellow hairs and a

row of black bristles on hind margin. *Abdomen* black, with transverse bands of small yellowish, yellowish-grey, or whitish scales, broadest on 2nd and 4th segments, where, especially towards sides, they reach up to and beyond middle of segment; a narrow basal band on 3rd segment and a narrow band on hind margins of 5th and 6th; a large bunch of elongate brownish-yellow scales towards and on sides of 1st, 2nd, and 3rd segments; dorsum of 1st with sparse concolorous fine hairs. Sides of 3rd and 4th segments with elongate brownish-yellow scaly pubescence, which is paler on the latter; sides of 5th and 6th segments with numerous elongate dark brown scales and long black bristles; posterior part of side of 6th segment with a conspicuous bunch of elongate snow-white scales; 7th segment with black scales only; all the dorsal surface of abdomen, not occupied by pale scales, covered with minute impressed black scales; sparse fine pale hairs on about basal half of dorsal surface, replaced on posterior half by black ones; hind margins of segments with a row of black bristles. Venter with a broad transverse band of yellowish scales beyond middle; remaining segments with white scales; whole surface of venter plentifully covered with long yellowish or yellowish-grey hairs, with fine black hairs towards tip. Genitalia brownish yellow, with a circlet of blunt reddish-brown spines and black pubescence. *Legs* black, coxæ with rather long grey or whitish pubescence; femora and tibiæ with small white or yellowish-grey scales and rows of black bristles. *Wings* nearly clear, the brown suffusion on anterior part in type-specimen limited to subcostal cell; in 2nd and 3rd specimens extending from costa up to but not encroaching on discal cell, dying away towards tip; anterior cross-vein just before middle of discal cell; halteres cream-yellow.

Described from three paratype ♀ ♀ in the Indian Museum, neither one being in sufficiently good condition to regard as the ultimate type; Simla, 7000–8000 ft., 26. v. 1914 (*Capt Evans*); Mussoorie, 6500 ft. (*Bond*); Guindy, Madras (*Capt. Patton*).

192. **Anthrax hottentotta**, *L.*, var. **claripennis**, *Brun.*

Anthrax hottentotta var. *claripennis*, Brunetti, Rec. Ind. Mus. ii, p. 452 (1909).

♀ *Head*: frons half as wide at vertex as at level of antennæ, where it is one-third of the head, black, covered (at least on lower part) with minute yellow impressed scales, and wholly covered with stiff black pubescence; face black, wholly covered with dense elongate yellowish-white scales; antennæ black, 3rd joint considerably elongate; proboscis obscure, withdrawn; occiput black, apparently covered with minute scales, which are yellow behind the vertex and white near the lower eye-margins. *Thorax* black, dorsum (apparently) covered with minute elongate yellow scale-like depressed pubescence; anterior margin, sides of dorsum, and the shoulders with dense elongate upright brownish-yellow scales;

sides with similar scales of a yellowish-white colour or concolorous long hairs. Scutellum black, hind border (probably whole surface, more or less) with minute impressed yellow scales (no bristles present on hind margin, but these have probably been broken off). *Abdomen* black, base of 2nd, 3rd, and 4th segments with broad transverse bands of minute pale yellow impressed scales, the band on 2nd segment the broadest; 5th, 6th, and 7th segments nearly wholly covered with yellowish-white scales, which are longest on the hind margins; 7th segment with a thick fringe on hind margin of very elongate yellowish-white scales; surface of abdomen which is not occupied by yellowish scales, covered with similar minute black scales. Sides of 1st segment with elongate yellowish-grey scaly pubescence, which extends as long fine concolorous hairs across the dorsum; sides of 2nd segment with scaly pubescence as on 1st, this pubescence being continued along sides of rest of abdomen, but in gradually diminishing quantity. Venter obscure, with minute snow-white impressed scales and long yellowish hairs on basal part, and with white hairs towards tips; genitalia brownish yellow. *Legs* black; coxæ with rather long yellowish or grey pubescence; femora and tibiæ with minute yellow and whitish impressed scales, often intermixed; the white ones predominating at base of middle femora and below hind femora. *Wings* entirely clear, hyaline; subcostal cell yellowish brown; bifurcation of 2nd and 3rd veins exactly in a line with anterior cross-vein, which latter is just before middle of discal cell; halteres pale creamy yellow.

Length, 12½ mm.

Described from the unique type in the Indian Museum from Bhura, in the plains of the Naini Tal District, Western Himalayas, 14–17. iv. 1907.

The differences distinguishing this variety from typical *A. hottentotta* of Europe are the clear wings, the wholly black-haired frons, the whitish scales on the face, and minor characters.

193. **Anthrax paniscus**, *Rossi*.

Bibio paniscus, Rossi, Fauna Etrus. ii, p. 256 (1790).
Anthrax bimaculatus, Macquart, Suites à Buff. i, p. 403 (1834).
Anthrax cingulatus, Meigen, Syst. Besch. ii, p. 145 (1820).
Anthrax hottentottus, Walker, List Dipt. Brit. Mus. ii, p. 259 (1849).

♂ *Head*: frons narrow, at vertex less than one-twelfth the width of the head, widening to nearly one-third of the head at the antennæ, dull black, with abundant black hairs and dark orange scales; face not projecting over mouth, dull black, with long yellow or orange scales and some long yellow hairs; mouth-border with some black scales; erect inconspicuous black hairs on upper eye-margins and on face; mouth-opening long, black. Occiput considerably puffed out, slaty black, lower part with whitish scales, which become silvery and less numerous behind upper eye-margin; extreme back of occiput with dense short

yellow pubescence. Proboscis long, narrow, labella brown; palpi long, narrow, black, concealed. Eyes with facets equal. Antennæ black, basal joints with dense black bristly hairs; 3rd joint slightly brownish, in the shape of a blunt triangle, tip produced to a long point with a minute apical bristle. *Thorax* dull black, with dense tawny scaly pubescence, which is thinnest on the disc, the latter bearing numerous adherent black scales and blackish-tawny hairs; furry pubescence extending from shoulders to wing-base and along dorsal side margins and hind margin; posterior calli with three to six long yellow spines or bristles, and about five smaller ones above the wings; a snow-white patch of scales in front of the absolute wing-base, not easily visible; pleuræ with dense tawny pubescence, thinner and more greyish on the lower parts. Scutellum with closely-adhering black scales and pale tawny pubescence, a row of black bristles on hind margin, and some small yellow scales towards side margins. *Abdomen* black, sides of first two segments rufescent; first four segments densely covered with tawny pubescence, paler and thinner on disc, the whole of which is covered with closely adhering black scales; side pubescence on 5th and 6th segments deep black; on 7th snow-white, the middle of the hind margin bearing black scales. Venter black, with closely adhering black scales, and with pale yellow pubescence and some elongate black scales and long black hairs towards side margins; hind margins of 2nd to 5th segments with some pale scales; genitalia very small, orange. *Legs* dull black; coxæ with pale yellow pubescence in front, more brownish behind, and bristly black hairs at tip; anterior femora with inconspicuous yellowish or blackish pubescence behind and beneath, hind femora with such at base only; pale scales on fore femora in front and behind, on posterior femora nearly over all the surface, and on basal half of posterior tibiæ and to a less extent on parts of the fore tibiæ; pulvilli absent. *Wings* quite clear or very pale grey, iridescent; base and fore margin yellowish brown down to 1st longitudinal vein or sometimes a little further, basal parts of veins black or brown; dense black scales on broadened base of costa, sometimes with some pale ones intermixed; occasionally a black spine at extreme base of fore margin; squamæ brownish yellow, margin darker, root black, fringe yellow or orange; halteres small, orange.

♀ Pubescence sparser than in ♂; 2nd, 3rd, and 4th abdominal segments with a band of pale scales. Frons at vertex one-eighth the width of the head, fully one-third at level of antennæ, with more numerous golden scales than in ♂ Silvery patch at wing-base absent. Abdominal pubescence longer; pale tufts at tip more yellowish than silvery, pubescence on disc thinner; a conspicuous band of golden scales on 2nd, 3rd, and 4th segments, the first one the widest, that on the 3rd segment the narrowest, all the bands narrower in middle; 6th segment with a narrow hind marginal band of scales, which is sometimes present on the 5th also; 7th segment with black scales on the disc, and yellow scales

and long yellow hairs on basal corners, besides conspicuous black pubescence. Venter black, white scales on 4th, 5th, and 6th segments, less abundant on 7th; hind margins of segments more or less with a narrow band of yellow scales and hairs; ovipositor orange.

Length, normally 12 mm., varying from 10 to 14 mm.

Naini Tal, 6000–7000 ft. (*R. E. Lloyd*). One specimen in the Indian Museum from Simla, x. 1906 (*Lefroy*).

The above description is an abbreviated one from Verrall, as the only Indian specimen and the three European specimens before me are in very indifferent condition, though there seems no doubt as to the identity of the species.

194. **Anthrax dia**, *Wied.*

Anthrax dia, Wiedemann, Anal. Ent. p. 23 (1824); id., Auss. Zweifl. i, p. 293 (1828).

"♂ Antennæ black (3rd joint missing). Epistoma and frons sparsely, the vertex a little more densely clothed with grey hairs. Occiput blackish, grey-haired, margins of eyes white. Collar grey; thorax with reddish-brown pile and grey hairs, mixed at sides with whitish hairs. Scutellum blackish, with traces of reddish-brown pile; sides of thorax with whitish hairs. The 1st abdominal segment with reddish-brown pile on the hind margin, with whitish hairs at sides; 2nd reddish brown with whitish band at base; 3rd with a narrow band across the middle; 4th with a very broad whitish band, so that only the reddish brown hind border remains; 5th and 6th whitish, only at the base narrowly reddish brown; 7th and 8th, on the contrary, only whitish at sides; venter blackish, with whitish hairs. Wings quite clear; brownish at extreme base and in the costal cell, the colour extending a little below this cell; halteres yellow. Legs black, with yellowish pile. Length 5½ lines. Tranquebar." (*Weidemann.*)

Type in Westermann's collection.

195. **Anthrax baluchianus**, sp. nov.

♂ ♀ *Head*: frons in ♂ from a quarter to one-fifth, in ♀ one-third, as wide at vertex as at just above antennæ, black, covered with yellowish-grey depressed scales and erect long fine black hairs; ocelli dull reddish brown; face clothed similarly to frons, but the scales longer and with yellow hairs instead of black; proboscis reddish brown; antennæ black, 1st joint with long black bristles, 2nd with shorter ones, 3rd elongate onion-shaped, with moderately long style, which becomes reddish brown towards tip; occiput covered exclusively with short depressed yellowish-grey scales. *Thorax* blackish, dorsum covered with minute yellowish-grey depressed scales; a thick collar of long yellowish scaly pubescence on anterior margin; side margins and the whole of the pleuræ similarly clothed; sides of dorsal margins with long

yellow bristles and a bunch of them on each posterior corner; scutellum with depressed small yellowish-grey scales and a row of strong deflexed yellow spines on hind margin. *Abdomen* black, each segment closely covered (in good specimens) with very small greyish depressed scales, which occupy about the basal half or rather more of the first two or three segments, covering more and more of each successive segment till the last ones are nearly wholly covered, the remainder of the dorsal surface bearing small black closely-impressed scales; before the hind margin on each segment is a row of strong black bristles; the moderately long pubescence sometimes yellowish (in the type ♀ it is wholly bright yellow on head, thorax, and abdomen); venter black, covered with depressed greyish scales and rather long concolorous fine hairs. *Legs* black; coxæ with pale yellowish-grey depressed scales and long concolorous hairs; femora and tibiæ with a close covering of small overlapping yellowish-grey scales; both femora and tibiæ with rows of black bristles; tarsi with a little short rich brown pubescence on underside. *Wings* practically clear; costal cell yellowish, the colour basally extending a little further hindward; another cross-vein just before middle of discal cell; a small bunch of short silvery-white scales at extreme base of costa and posterior to the strong black scales on the adjacent costal margin; halteres pale brownish cream-colour, hidden in the pubescence.

Length, 13 mm.

Described from several specimens, mostly in inferior condition, except the type ♂ and ♀, in the Indian Museum, from Baluchistan (*Cleghorn*), and several others in good condition from Kashmir, 1915 (*H. T. Pease*): Bahisht Khal, 6 and 8. ix. 1908 (*Nadir Khan*); Bhittani, on camel.

196. **Anthrax albofulva**, *Walk.*

Anthrax albofulva, Walker, Ins. Saund., Dipt. pt. 3, p. 182 (1852); Brunetti, Rec. Ind. Mus. ii, p. 454 (1909).

♂ ♀ *Head*: frons in both sexes at level of antennæ barely one-third width of head, less than one-fourth of that width at vertex in ♂, and half that width in ♀, dark grey, with long, rather dense pale yellow scaly, almost bristly pubescence, and a space in the middle with long black similar pubescence; face with similar pubescence, which is sometimes yellowish on upper part and white on lower part, or wholly snow-white throughout; antennæ black, first two joints with bristly yellow pubescence, 3rd joint elongate onion-shaped, with a minute pale style-like thick bristle at tip; mouth-opening very large, proboscis obscure, withdrawn; occiput dark grey, with more or less minute scaly pubescence round hind border of eyes. *Thorax* blackish, with minute yellow depressed scales on dorsum; anterior and side margins with pale yellowish-grey elongate scaly pubescence, which (apparently) is not dense; two or three long yellow spines on posterior corners; sides of thorax bluish grey, with nearly whitish pubescence.

Scutellum concolorous with dorsum, with minute yellow depressed scales and some longer pubescence and a row of yellow bristles on hind border. *Abdomen* dark grey or blackish, wholly covered with minute yellow depressed elongate scale-like pubescence; a large fan-shaped bunch of nearly white long scaly pubescence towards sides of 1st segment, extending inwards across the disc; sides of rest of segments with soft whitish outstanding hairs; ground-colour of sides of first five segments more or less orange or brownish yellow, the colour sometimes entirely absent. Venter varying from pale yellowish to dark grey, with darker marks, some depressed minute white scales and some longer whitish hairs; genitalia large, brownish yellow, with long pale hairs. *Legs* yellowish; coxæ more or less bluish grey, with a little whitish pubescence; in the ♂ the basal half of the anterior femora and nearly all the hind femora black, with minute whitish scales; in the ♀ basal half of fore pair narrowly at base in middle pair, and apical half or less of hind femora black, with minute whitish scales; apical third or half of tarsi in both sexes blackish. *Wings* clear, subcostal cell yellowish; 2nd longitudinal vein normally with a distinct upward curve, followed by a distinct downward one just before tip; anterior cross-vein at one-third (or a little beyond) of discal cell, placed some distance beyond tip of præfurca; anal cell rather narrowly open.

Venation rather variable: in one specimen from Allahabad the anal cell is very broad, and equally so for the whole of its length to the wing-border; in others the degree of curvature on apical half of 2nd vein varies considerably, as does also the exact position of the anterior cross-vein in its relation to the discal cell.

Length, $4\frac{1}{2}$–$6\frac{1}{2}$ mm.

Described from several specimens of both sexes in the Indian Museum and Pusa collections.

Type in the British Museum (the head missing).

197. **Anthrax aureohirta**, *Brun.*

Anthrax aureohirta, Brunetti, Rec. Ind. Mus. iii, p. 223 (1909).

♂ *Head*: frons at vertex one-eighth width of head, widening to barely double this width at the level of the antennæ, black, slightly shining; ocelli on small raised tubercle; face black; some white dust on each margin of the lower part of frons and of the face, and yellow and black short hairs intermixed above and below the antennæ, which are wholly black, the first two joints bearing some stiff black hairs, the third with soft white microscopic pubescence; proboscis somewhat large, blackish at base, brownish towards tip, with some hairs; eye-margins rather deeply cut away at the middle of the side; occiput considerably puffed out, black, with golden-yellow hairs at the sides and a fringe of stiff bright yellow hairs at the back, and with microscopic black hairs on the remaining portions. *Thorax* black, with short, not thick,

bright golden-yellow hairs, also a bunch of bristly yellow hairs on each side, just behind the shoulder, with some yellow bristles; some yellow hairs on anterior margin. A large reclinate yellow spine above each wing-base and three or four black bristles on posterior portion of dorsum. Sides of thorax ash-grey, with some patches of whitish hairs; scutellum black, with golden-yellow hairs and some black bristles towards posterior margin. *Abdomen* moderately shining black, rather closely covered with short, bright golden-yellow hairs, which form a large fan-shaped bunch on each side of the 1st segment, where they become almost scaly; there are short black hairs intermixed with the yellow towards the sides of the dorsum; venter with close, soft, bright yellow hair. *Legs*: coxæ black, with whitish hairs; femora and tibiæ yellow, with short black bristles, which are longest on the latter and form a circlet at the tips of the tibiæ; tarsi black, with very short pubescence and bristles. *Wings* very pale brown up to just beyond the middle, where the colour fades away; halteres creamy yellow.

Length, 5 mm.

Described from a unique specimen in perfect condition in the Indian Museum collection, from Calcutta, 1. vi. 1909.

This species does not fall quite naturally into any of my temporary divisions of this genus, as the darkening of the wing does not partake of the usual oblique form, the coloration extending over the whole basal half of the wing.

198. **Anthrax clausa**, *Brun.*

Anthrax clausa, Brunetti, Rec. Ind. Mus. ii, p. 477 (1909).

♂ *Head* slightly broader than thorax and abdomen; frons and face black, clothed with dense short black hairs; eyes distinctly separated at vertex, the ocelli being placed well forward, the frons widening very rapidly, until at the insertion of the antennæ it occupies half the width of the head. Antennæ black; first joint cylindrical, second sub-spherical, much shorter than first; third onion-shaped, with long style, small, narrower, and shorter than second. Underside of face uniformly black, proboscis almost invisible; back of head dark grey, with a few whitish hairs. *Thorax* dull black; anterior border with a rather thick fringe of grey hairs, which apparently cover both dorsum and sides. *Abdomen* linear, with conical tip, of same width as thorax; dull black (denuded), probably when in good condition the whole abdomen is covered with whitish-grey hairs. The present specimen has bunches of such hairs at the sides of the abdomen towards the base, also at the tip; the dorsum shows little traces of hair, and on it the hair is probably always sparser; at the sides of the abdomen towards the base are patches of all-black hairs; venter black, nearly bare. *Legs* blackish, the inner sides of the anterior tibiæ with a brown tint; femora below with some soft moderately long blackish hairs; fore tibiæ with a single row of small black

bristles, middle pair with a similar row on both outer and inner sides, and hind pair rather thickly clothed with them. *Wings* clear; anal cell closed immediately before the border; discal cross-vein placed just beyond one-third of the discal cell; first posterior cell widely open; fork of the third vein showing a tendency to form an appendix; halteres cream-white; tegulæ small, dirty white, transparent, with a fringe of short grey hairs.

Length, 8½ mm.

Described from a unique ♂ in the Indian Museum from Moulmein, Lower Burma, iii. 1908 (*Annandale*).

The only species described from the East with the anal cell closed.

The following species have been recorded from "East India," but may be regarded as requiring further confirmation. They are therefore not included in the table of species:—

199. **Anthrax troglodyta**, *F.*

Bibio troglodyta, Fabricius, Syst. Ent. p. 759 (1775).
Anthrax troglodyta, Wiedemann, Auss. Zweifl. i, p. 306 (1828); Wulp, Notes Leyd. Mus. vii, p. 83 (1885); de Meijere, Tijd. v. Ent. l, p. 240 (1907).
Anthrax hyalina, Wiedemann, Dipt. Exot. i, p. 141 (1821); id., Auss. Zweifl. i, p. 297 (1828); Wulp, Tijd. v. Ent. xxiii, p. 165 (1889).
Anthrax lucens, Walker, Ins. Saund., Dipt. pt. 3, p. 180 (1852).

"Black, head tawny beneath: chest and breast clothed with tawny hairs; a tuft of white hairs on each side above the base of the wing; abdomen obconical, a little shorter than the chest, clothed on each side with alternate patches of black and white hairs; legs clothed with very short black hairs. Wings colourless, dark brown at the base, adorned on each shoulder with a patch of silvery-white hairs; wing-ribs and veins black. Length 4½ lines, wings 12 lines. East India." (*Walker.*)

Type in Fabricius's collection.

The above is Walker's description of *lucens*, which is said to be identical with *troglodyta*.

200. **Anthrax lucida**, *Walk.*

Anthrax lucida, Walker, Ins. Saund., Dipt. pt. 3, p. 179 (1852).

"♀ Black; thickly clothed with bright tawny hairs; head clothed above with black hairs; abdomen nearly linear, truncated at the tip, hardly shorter than the chest; tip clothed with black hairs and adorned on each side with a tuft of yellowish-white hairs; wings colourless, brown along the fore border for two-thirds of the length; wing-ribs and veins black, the latter pitchy beneath the fore border; poisers yellow. The brown on the wing of this species is much narrower than that of *A. manifesta*. Length 6 lines, wings 14 lines. East India." (*Walker.*)

Type in the British Museum.

201. Anthrax limpida, *Walk.*

Anthrax limpida, Walker, Ins. Saund., Dipt. pt. 3, p. 179 (1852).

"Black; head clothed above with short tawny, and longer black hairs, beneath with longer tawny hairs; chest clothed with bright tawny hairs; abdomen slightly obconical, somewhat truncated at the tip, shorter than the chest, clothed with pale tawny hairs; legs clothed with short black hairs; wings colourless, with a very narrow brown stripe along the fore border for more than two-thirds of the length; wing-ribs pitchy, veins black, pitchy at the base and along the fore border; poisers pale yellow. Length 5 lines, wings 12 lines. East India." (*Walker.*)

Type in the British Museum.

202. **Anthrax referens,** *Walk.*

Anthrax referens, Walker, Ins. Saund., Dipt. pt. 3, p. 189 (1852).

"Black; head clothed with short ferruginous hairs, and on the crown with some black hairs; mouth pitchy, each side of the chest adorned with a stripe of white hairs; breast grey, clothed with ferruginous hairs. Abdomen obconical, much shorter than chest, adorned towards the tip with two interrupted bands of white hairs; base clothed with pale tawny hairs; hind borders of segments clothed with short ferruginous hairs; sides adorned with alternate tufts of black and white hairs; underside ferruginous; legs pitchy, clothed with very short black hairs and bristles; thighs and shanks adorned with a tawny tinge. Wings dark brown from the base along the fore border to the tip and along the hind border to the end of the inferior part; this brown part includes a nearly colourless dot, and its outline has two deep and irregular inward curves; wing-ribs and veins black; poisers pitchy, with pale yellow tips. Length of body 4–4½ lines, wings 11–12 lines. East India." (*Walker.*)

Type in the British Museum.

Subfamily LOMATIINÆ.

Præfurca ending, that is to say, 2nd and 3rd veins separating, nearly opposite base of discal cell. Antennæ more or less approximate at base; proboscis usually short, sometimes porrect; abdomen rather oblong, but not cylindrical. Head hardly transverse, closely applied to thorax; face generally produced; eyes in ♂ approximate or contiguous, wide apart in ♀; occiput generally puffed out. Thorax not humped, with few or no bristles; scutellum large, without strong bristles. Abdomen longer than broad, generally oblong, without bristles. Legs with few or no bristles, except spicules on tibiæ. Wings with 2nd vein and upper branch of 3rd strongly looped, more or less parallel to each other towards tips; anterior cross-vein placed considerably beyond middle of discal

cell, often sloping ; two or three submarginal cells, four posterior cells, 1st either open or closed; anal cell generally open.

This subfamily is by no means properly understood, nor its limits satisfactorily defined.

The present acceptance of it is in Verrall's sense, and only one genus with a single species is Indian.

Genus **APHŒBANTUS**, *Lw.*

Aphœbantus, Loew, Berl. Ent. Zeit. xvi, p. 253 (1872).
Triodites, Osten-Sacken, Bull. U.S. Geolog. Survey, iii, p. 245 (1877).

GENOTYPE, *Aphœbantus cervinus*, Loew ; by original designation.

Body and whole appearance *Anthrax*-like ; wings long. Bifurcation of 2nd and 3rd longitudinal veins at some little distance (but not greatly) before anterior cross-vein. Frons in ♂ comparatively wide. Antennæ remote at base ; 1st joint short, 2nd very short ; 3rd short, more or less onion-shaped, with styliform prolongation, not separated by a suture, with or without a bristle at tip. Labella large, fleshy. Angulation of 3rd vein with or without appendix. Small but distinct pulvilli ; generally a long bristle at end of hind metatarsus.

Range. All the previously known species come from North America, except one occurring in Central America.

At the time of describing *Argyramœba ceylonica* the possibility of it being an *Aphœbantus* did not occur to me, as the genus was unknown from any part except North America and a single species from Central America. An unnamed specimen of my species in the British Museum, labelled " ? *Aphœbantus*," first called my attention to the genus, but no authenticated specimen definitely referred to the genus has been available for comparison, so I adopt it with some hesitation.

The species agrees with Osten-Sacken's characters of the bifurcation of the 2nd and 3rd veins, occurring at " some distance before " the anterior cross-vein ; as a matter of fact, it occurs in a line with or just beyond the base of the discal cell. The antennal 3rd joint shows no sign of any pencil of hairs, but a suture (about as far from the tip as in *Argyramœba*) is more or less obvious under a microscope in all the twenty or more specimens, mostly in good condition, examined, and the minute bristle at the extreme tip is apparent. This, however, is hardly my interpretation of Osten-Sacken's words " a minute, sometimes scarcely apparent joint," which seems to refer rather to size than distinctness of outline.

A. ceylonicus is admitted to *Aphœbantus* herein on the strength of the proximal bifurcation of the 2nd and 3rd veins, in conjunction with the absence of the antennal pencil of hairs.

The existence of my *Argyramœba intermedia* and a probable second closely-allied species with nearly clear wings somewhat

complicates matters, as these two forms possess a distinct pencil of hairs, whilst the bifurcation of the 2nd and 3rd veins takes place half-way between the base of the discal cell and the anterior cross-vein, its exact position not being constant.

203. Aphœbantus ceylonicus, *Brun.*

Argyramœba ceylonica, Brunetti, Rec. Ind. Mus. ii, p. 471, pl. xii, fig. 24 (1909).

♂ ♀ *Head*: frons in ♂ at vertex very narrow, one-fifth or one-sixth of its width at level of antennæ, where it is less than a third the width of the head and widens from the vertex very rapidly; frons in ♀ one-third as wide at vertex as it is at level of antennæ, where it forms less than one-third of the head; frons and face dark grey, face sometimes lighter, covered rather densely with bright yellow elongate scaly pubescence, which is generally paler on face, even whitish or quite white; antennæ black, 3rd joint onion-shaped, with a moderately long style, basal joints with black bristles; proboscis brownish, withdrawn; occiput ash-grey, much puffed out behind, especially in the ♀, covered with minute impressed bright yellow scales; side indentation of eye-margins very considerable. *Thorax* black, dorsum covered thickly with very minute bright yellow depressed scales and scale-like hairs, and with long pale yellow hairs rather thinly interspersed; a collar of very long elongate pale yellow scales on anterior margin, a bunch of slightly shorter and paler ones on shoulders; several large yellow spines in front of wing-base and on posterior corners of dorsum, and a row of yellow bristles towards hind margin; sides of thorax ash-grey, with a bunch of pale yellowish pubescence below shoulders, also in front immediately below head; sternopleuræ with silky white pubescence; scutellum with yellow pubescence as on thorax, and a row of yellow bristles on hind margin. *Abdomen* normally with middle part longitudinally to a greater or less width black, remainder of dorsum brownish yellow; often the black colour covering nearly the whole surface, whilst sometimes reduced (at least on anterior half of abdomen) to the middle third; hind margin of abdomen more or less yellowish; 1st segment mainly black, yellowish towards sides, with a thick bunch of yellowish scales covering each outer third, leaving the middle third bare; hind margin with minute bright yellow scales; whole surface of abdomen covered with minute bright yellow semi-depressed thick hairs, with longer black thin hairs interspersed; sides of abdomen with moderately long thin pale yellow hairs, no trace of scales. Venter yellowish, more or less blackish in middle or towards base, sometimes nearly all blackish, covered with minute yellow pubescence; genitalia brownish yellow, mainly concealed. *Legs*: coxæ ash-grey, with long whitish pubescence; femora and tibiæ yellow; about apical half of anterior tarsi and all the hind tarsi black, at most the latter a little pale at base in

individuals; hind femora with a row of black bristles behind; all tibiæ with the usual rows of small black bristles; hind femora with a number of small black bristles on upperside at tip, giving the appearance of the tip being blackish. *Wings* nearly clear, costal and subcostal cell yellowish or dusky, the colour sometimes extending a little posteriorly, or in some specimens faintly or more distinctly across the wing, even to the hind margin; tip of wing generally clear; 2nd longitudinal vein rather deeply looped towards tip; upper branch of 3rd vein with or without appendix; halteres mainly yellow.

Length, 5-8 mm.

Redescribed from several of each sex in the British and Indian Museums and the Pusa collection: Kalimpong, Darjiling District, 800–4500 ft., 24.iv.–10.v.1915 (*Gravely*); Allahabad, 21–29.iii. 1906 (*Howlett*); Pusa, Bengal, not uncommon, i, iii, vii, xi, parasitic in cells of *Pseudagenia clypeata* (*G. R. Dutt*); Chapra, Bengal; Calcutta, 4.iv.1913 (*Gravely*), 1.vi.1909; Kandy, v.1892 (*Yerbury*); Heneratgoda, Ceylon, 26.vi.1892 (*Yerbury*); Pundaluoya, Ceylon (*Green*).

Types in the Indian Museum.

This redescription varies somewhat from the original, but must be taken as an improved one, built on the study of considerably more specimens, mostly in good condition.

Description of the pupa-case. Pale yellowish, 10-segmented, the 1st with a brown prolongation, bearing six very strong blunt black spines arranged two in an upper and four in a lower row; two similar but much smaller black spines in middle of underside of segment; 1st segment smooth and bare; 2nd similar, but with three or four very long filamentous pale yellow strong curved hairs on each side; 3rd segment bare, except for a row placed just behind front margin, of very long, closely-placed, similar curved hairs, which are almost spine-like at base, but taper gradually so that the major portion is flexible; there are also three very long yellowish similar bristly curved hairs (their bases not spine-like) on each side of the segment. Dorsum of each remaining segment with a transverse row, placed at about middle of segment, of twelve or more strong bright brown hooks, about three-fourths of the length of each being fixed to the surface, and the tips curved upward and forward, evidently designed to hold the pupa-case tightly, enabling the imago to draw itself free and escape. These hooks are largest in the middle of the row, and gradually diminish in size towards the sides, where are several very long bristly hairs as on 3rd segment; also *between* each two hooks, its roots near the upturned portion (of the hooks), is a similar rather shorter (though still actually very long) bristly curved hair. On 4th, 5th, and 6th segments the hooks are very large and strong, on the 7th considerably smaller, and on the next three segments smaller still; but the long bristly pale yellow hairs are equally long on all the segments, except the 10th, on which they are distinctly shorter. Tip of 10th segment formed

into a blunt cone with two short strong brown blunt spines at extreme tip and a similar smaller spine above them, placed a little anteriorly. Venter with a transverse row of moderately long pale hairs placed behind the middle of each segment.

Length, 10–12 mm., measured along dorsal line from tip to tip; probably variable.

Subfamily BOMBYLIINÆ.

Head smaller than in ANTHRACINÆ, rarely transverse or wider than thorax; back of head much puffed out; eyes contiguous or subcontiguous in ♂, distinctly separated in ♀; if wide apart in ♂, then abdomen short and broad. Antennæ approximate at base, variable in structure, with an apical style of variable form, sometimes imperceptible. Proboscis variable in length, generally elongate and porrect. *Thorax* generally well, often considerably, arched, usually with dense furry pubescence; in some genera nearly bare. *Abdomen* usually short, broad and rounded, rarely conical; frequently with dense furry pubescence. *Legs* generally long and thin, sometimes bare or apparently so, often with stick-like spines below the femora, or with spicules, or with a circlet of apical spines to the tibiæ. Two pulvilli. *Wings* with the praefurca short; one to three submarginal cells; three or four posterior cells; 2nd and 3rd longitudinal veins usually emerging at an acute angle, the latter approximately opposite base of discal cell; 3rd vein nearly always forked; discal cell rarely absent; anal cell open or closed.

This subfamily differs from the ANTHRACINÆ by the divergence of the 2nd and 3rd veins at an acute angle at some distance before the anterior cross-vein, from the TOXOPHORINÆ and SYSTROPINÆ by the short rounded abdomen, and from the LOMATIINÆ (less distinctly) by the rounder abdomen, the longer proboscis, and less upturned 2nd vein.

Table of Genera.

1. One submarginal cell only	EMPIDIDEICUS, Beck., [p. 260.
Two or more such cells	2.
2. Four posterior cells	3.
Three posterior cells.	7.
3. First and second antennal joints subequal	PHTHIRIA, Mg., p. 284.
First antennal joint much longer than 2nd	4.
4. First basal cell distinctly longer than 2nd; anterior cross-vein towards or at middle of discal cell	5.
The two basal cells subequal, through anterior cross-vein being near base of cell	6.
5. First posterior cell closed	BOMBYLIUS, L., p. 261.
First posterior cell open	DISCHISTUS, Lw., p. 273.

6. Underside of head moderately pubescent. — SYSTŒCHUS, Lw., p. 275.
   Underside of head densely pubescent. — ANASTŒCHUS, O.-S., [p. 278.
7. Abdomen rather long, conical, or narrow; eyes in ♂ contiguous; scutellum more or less triangular .... — GERON, Mg., p. 279.
   Abdomen short and broad; eyes in ♂ generally narrowly separated; scutellum shorter and broader — USIA, Latr., p. 281.

Genus **EMPIDIDEICUS**, *Beck.*

Empidideicus, Becker, Zeits. f. Hymen. u. Dipt. vii, p. 97, fig. (1907).

GENOTYPE, *Empidideicus carthaginiensis*, Beck.; by original designation.

Very small bare species. *Head* placed low on the thorax; antennæ with 1st joint microscopic, 2nd extremely short, 3rd comparatively large, elliptical, with small apical thickly pubescent style; occiput more or less puffed out. *Thorax* considerably arched. *Abdomen* of six distinct segments. *Legs* simple, moderately long, bare. *Wings* with distinctive venation: auxiliary vein short, ending free; 1st vein ending at about middle of costa; 2nd vein absent (genotype) or present (*indicus*); when present, very short, turning sharply upwards and ending in 1st vein near its tip; 3rd vein simple, ending at some little distance before wing-tip; 4th vein forked, sometimes indistinct on the portion dividing the basal cells; 5th vein forked, base of upper branch forming lower side of 2nd basal cell; 6th vein attaining wing-border; anterior cross-vein present; discal cell absent; one submarginal, three posterior cells; anal cell open; squamæ absent.

Allied to *Glabellula*, *Cyrtosia*, and *Apolysis*, only one other species (from the Tunisian coast) except *indicus* being known.

204. **Empidideicus indicus**, *Brun.*

Empidideicus indicus, Brunetti, Rec. Ind. Mus. xiii, p. 77 (1917).

♀ *Head*: frons apparently about one-fourth width of head, yellowish; antennæ black; proboscis more than 1½ times height of head. *Thorax* black, practically bare; humeri bright yellow. *Abdomen* black, hind margins of segments pale yellow, and a transverse yellow line across middle of 1st and 2nd segments. *Legs* black, knees and tips of tibiæ yellowish. *Wings* pale grey; auxiliary vein short, ending free; 1st vein ending at middle of costa; præfurca beginning at middle of 1st vein; 2nd vein very short, directed abruptly upwards, ending in 1st vein near tip; 3rd vein in line with præfurca, simple, ending a little before wing-tip; 4th vein forked at half its length after quitting basal cells, the section dividing those cells hardly less distinct; 5th vein forked, base of upper branch forming lower side of 2nd basal

cell; 6th vein reaching wing-border; 1st basal cell a little longer than 2nd; bifurcation of præfurca opposite tip of 2nd basal cell.

Length, 1 mm.

Described from four paratype specimens in the Indian Museum in very indifferent condition, taken by Dr. Annandale at Simla, 7000 ft., 16. v. 1909, on flowers of white stonecrop, and 7. v. 1910, also at Simla.

The species conforms to all the generic characters except in the presence of the 2nd vein, which, according to Becker, is anastomosed with the 3rd. In his species, also, the basal cells are equal in length, and he does not mention the auxiliary vein, which, however, is easily overlooked in *indicus*. Temporarily, at least, the species may be located in this genus. Verrall figures the wing of this genus (Brit. Flies, v, p. 484, fig. 272).

Genus **BOMBYLIUS**, *L.*

Bombylius, Linnæus, Syst. Nat. Ed. x, p. 606 (1758); Brunetti, Rec. Ind. Mus. ii, p. 456 (1909).
Parisus, Walker, Ins. Saund., Dipt. pt. 1, p. 197 (1852).
Choristus, Walker, Ins. Saund., Dipt. pt. 1, p. 196 (1852).

GENOTYPE, *Bombylius major*, L.; by designation of Latreille,

Head small, semicircular, set rather low and closely applied to thorax; face short, densely pubescent; frons in ♀ with long pubescence or scales; three ocelli; eyes elliptical, bare, contiguous in ♂, wide apart in ♀, without an indentation at middle of hind margin. Proboscis very long, thin, pointed; labella small. Antennæ porrect, approximated at base; 1st joint much longer than 2nd, with long stiff hairs; 2nd short, cup-shaped; 3rd elongate, variable in shape, conical, peg-shaped, long strap-shaped, or rarely leaf-like, occasionally with dorsal scales; style jointed, terminal. *Thorax* oval, short, considerably arched, with dense furry pubescence; sometimes distinct presutural bristles present. Scutellum broad, semicircular, clothed as the thorax, occasionally with scales only. *Abdomen* rounded, short, well arched, 7 segmented, the terminal ones withdrawn, all with dense furry pubescence, often with longer and more bristly hairs intermixed. *Legs* long and thin, bearing spicules; hind legs elongate, hind femora often with stiff bristly spicules below; all tibiæ with rows of minute spicules and small terminal spurs; pulvilli distinct, empodium minute. *Wings* at rest, outspread, rather narrow; subcostal cell very narrow; 3rd vein forked; anterior cross-vein at or before middle of discal cell, erect; two submarginal and three posterior cells, all open; 1st basal cell always longer than 2nd, but sometimes only a little longer; anal cell narrow, open. The wings often prettily marked either with spots or the diagonal baso-costal band so common in this family.

Range. World-wide; a very large genus.

Life-history of a few European species partially known, the

larvæ preying upon the larvæ, and perhaps pupæ also, of small bees (*Andrena*, *Halictus*, etc.).* The larva and pupa of *Bombylius major*, L., has been obtained from the nests of *Andrena*. The pupa of *Bombylius* has cephalic spines which act as digging organs.

Table of Species.

1. Wings with narrow black band at base and a brown suffusion across middle; abdomen with bright red pubescence, and white pubescence at tip; length 10–13 mm.	*orientalis*, Macq., p. 263.
Wings without suffusion across middle; abdomen never as above	2.
2. Wings wholly dark brown except hind border, where the colour fades away; abdomen in ♂ with silvery-white, in ♀ with fiery-red pubescence; length 4–5 mm.	*wulpii*, Brun., p. 264.
Wings clear, with dark brown band on fore border, irregular in width, reaching nearly to tip on costa and posteriorly nearly to middle of wing; length 8–12 mm.	*major*, L., p. 265.
Wings clear, or at most brownish or brownish yellow at base, the colour never extending more than half across wing (in *propinquus* only) .. .	3.
3. A conspicuous row of erect black spines on hind border of abdominal segments; length 8–12 mm.	*erectus*, Brun., p. 267.
Abdomen without such spines; length at most 6 mm.	4.
4. Legs black; head with silvery-white hair-spots†	5.
Legs pale yellow	6.
5. Third antennal joint twice as long as 1st and 2nd together; extreme base of wing dark brown; subcostal cell pale yellowish	*maculatas*, F., p. 267.
Third antennal joint subequal to 1st and 2nd together; wing practically clear, only extreme base and the subcostal cell very pale yellowish	*comastes*, Brun., p. 268.
6. First antennal joint pale yellow; 3rd joint nearly double 1st and 2nd together; anterior cross-vein at one-third of discal cell; 1st basal cell very little longer than 2nd; only 1st basal cell and subcostal cell very slightly brownish.	*vicinus*, Brun., p. 270.
Antennæ all black.	7.

* See Verrall ('British Flies,' v, p. 502) for interesting notes on the habits of *B. canescens*, a European species.

† *B. albosparsus*, Big., comes here, but I cannot define it more narrowly.

7. Snow-white pile and hairs at tip of abdomen; 3rd antennal joint nearly double as long as 1st and 2nd together — *terminalis*, Brun., p. 270.
   No white hairs on abdomen . — 8.
8. Wings clear, brown at base, nearly up to anterior cross-vein .. .. .. — *fulvipes*, Big., p. 271.
   Basal half of wing diagonally brown, the colour dying away gradually — *propinquus*, Brun., p. 272.

In comparisons between the length of the proboscis or abdomen relatively to that of the thorax the scutellum is not included.

205. Bombylius orientalis, *Macq.*

Bombylius orientalis, Macquart, Dipt. Exot. ii, pt. 1, p. 90, pl. vi, fig. 2 (1840); Brunetti, Rec. Ind. Mus. ii, p. 456 (1909).
Bombylius tricolor, Guérin, Icon. Règne Anim. iii, p. 538, pl. xcv (1829-1838).

♂ ♀ *Head*: in ♂, vertex very small, black, with black hairs; frons and face black, former with long whitish or yellowish-white hairs, similar hairs adorning each side of the face; lower part of head devoid of pubescence; occiput with brownish-yellow hairs. Antennæ black; 3rd joint twice as long as 1st and 2nd together, tapering; 1st joint with long grey hair above and below.

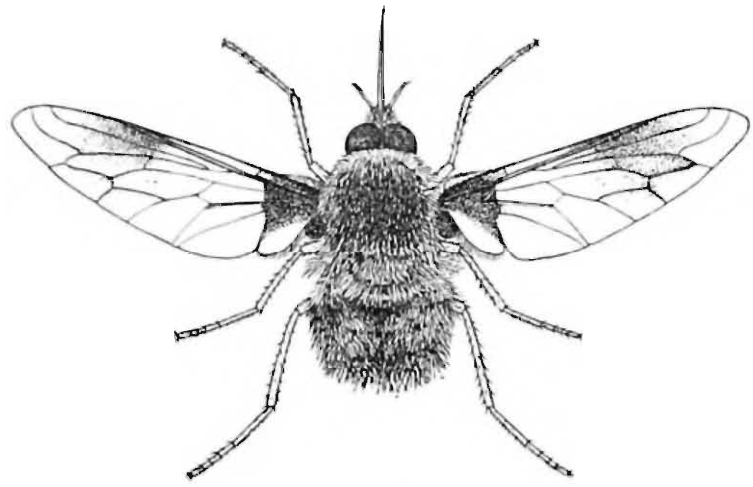

Fig. 14.—*Bombylius orientalis*, Macq.

Proboscis black, as long as from the frons to hind border of thorax; palpi brownish black. In ♀, frons about one-third the width of the head, slightly narrower above, with greyish pubescence; in all else as in the ♂ *Thorax* and scutellum closely covered with rather short brownish-yellow pubescence. *Abdomen* black, with thick yellowish-grey hairs towards sides and at base, and with the tip covered with whitish hairs; the remainder of the dorsum covered with fiery-red or orange-red hairs; the pubescence in the

median line of the hinder part of the abdomen much thinner; the pubescence extends thickly over the sides, the central space of the ventral surface bearing short grey pubescence. *Legs* all black; hind femora with some rows of short black bristles below; anterior femora with some short soft hairs below; very small bristles on all tibiæ. *Wings* pale grey; a narrow basal black band not reaching as far distally as the humeral cross-vein and the alulæ; a broad, rather pale brownish, distinct but ill-defined band across middle of wing from costa nearly or quite to hind border, beginning before the anterior cross-vein and ending about level with the tip of the 2nd longitudinal vein; costal and subcostal cells a little brownish; halteres black.

Length, 13–15 mm.

Redescribed mainly from three ♂♂ in good condition in the Indian Museum from Anwarganj, Cawnpore Distr., 1–13. x. 1911 (*Caunter*); Coorg, S. India (*Hannyngton*); and Karikkuppaur, S. India, 2500 ft., 21. x. 1910. Other examples are from Dehra Dun, ix. 1913 and x. 1914 (*Chatterjee*), 9. vii. 1913; Palamow, Bengal; Chapra, Bengal, common (*Mackenzie*); Bangalore; Ranchi; Hadagalli, Ceylon.

Type in the Paris Museum.

206. **Bombylius wulpii**, *Brun.*

Bombylius wulpii, Brunetti, Rec. Ind. Mus. ii, p. 457 (1909); id., *op. cit.* iii, p. 26 (1909).
Bombylius pulchellus, Wulp (*nec* Loew, 1863), Tijd. v. Ent. xxiii, p. 164, pl. x, fig. 8 (1880).
Comastes pulchellus, Wulp, Cat. Dipt. S. Asia, p. 74 (1896).
Eucharimyia dives, Bigot, Bull. Soc. Ent. France, (6) viii, p. cxl (1888).
Bombylius scintillans, Brunetti, Rec. Ind. Mus. iii, p. 224 (1909).

♂ ♀. *Head* in ♂ nearly as broad as thorax, black; eyes contiguous for about half the distance between vertex and antennæ; upper facets much larger than and divided clearly from lower ones; eyes reddish or dark brown; vertex distinct, ocelli red; antennæ black, 3rd joint nearly double as long as 1st and 2nd together, long bushy black hairs on 1st joint; clypeus shining dark brown or blackish, the centre part devoid of pubescence; a small conspicuous spot of silvery-white scales on each side of the antennæ and another larger one on each side of the face; proboscis black; occiput blackish, with bushy bright yellow hairs on upper part and long black hairs on lower part. In ♀, frons nearly one-third of the head, a little narrower above, black, covered with bright deep yellow scaly hairs or scales; four white scale-spots on head as in ♂; occiput with bright yellow pubescence; face nearly bare. *Thorax* in ♂ deep black, with black pubescence, the anterior part of dorsum with bright yellowish hairs; scutellum black, with long black hairs; a white scale-spot just behind each humerus. In ♀, dorsum and

scutellum with fiery reddish-yellow scaly hairs and a few black bristly hairs along sides of thorax and on scutellum. *Abdomen* in ♂ dull shining black, with some long black hairs on 1st segment and on the wholly black venter; remainder of dorsal surface covered closely with shining silvery-white scales. In ♀, abdomen covered with fiery reddish-yellow scaly hairs; a small white scale-spot at the sides of both 2nd and 4th segments; remainder as in ♂ *Legs* black; anterior femora with short soft black hairs below, hind pair with some rows of small black bristles below; tibiæ with numerous small bristles. *Wings* deep smoky brown, nearly black at base and on basal part of costa; hind border paler, the colour dying away gradually; a blackish spot at upper angle of 2nd basal cell; halteres black. Anterior cross-vein distinctly before middle of discal cell; 1st basal cell distinctly longer than 2nd.

Length, 4–5 mm.

Redescribed from several specimens from Dehra Dun, vi. 1913, vi. 1914 (*Chatterjee*); Bellary, 30. viii. 1912; Cheria Island, Chilka Lake, Orissa, 21. viii. 1914; Talewaddi, N. Kanara Distr., 3–10. ix. 1916 (*Kemp*); Kulattupuzha, Travancore, 19. xi. 1908, and Tenmalai, Travancore, at light, 22. xi. 08 (*Annandale*); Parambikulam, 1700-3200 ft., Cochin State, 16–24. ix. 1914 (*Gravely*); Madulsima, Ceylon, 19. i. 1909, and 9. viii. 1908 (*T. B. Fletcher*); Kandy, viii. 1892 (*Green*): Hambantota, Ceylon, 12. i. 1908; Maruthamalai Lashio, Upper Burma, 3000 ft., 23, 24. viii. 1914 (*Fletcher*).

207. Bombylius major, *L.*

Bombylius major, Linnæus, Syst. Nat. Ed. x, p. 606 (1758); Fabricius, Syst. Antl. p. 128 (1805); Meigen, Syst. Besch. ii, p. 190 (1820); Macquart, Hist. Nat. Dipt. i, p. 377, pl. ix, figs. 9, 10 (1834); Schiner, Faun. Austr., Dipt. i, p. 60 (1862); et auct. plur.*

Bombylius sinuatus, Mik, Monog. Bomb. Bohem. p. 35, pl. xi, fig. 4 (1796).

Bombylius variegatus, De Geer, Ins. ed. Goeze, vi, p. 107, pl. xiv, fig. 10 (1782).

♂ *Head* with vertex greyish black, triangular, elevated, with long black hairs; frons brownish grey, with a middle furrow, and long dense hair, which is black on upper part but becomes light brown near the antennæ, also with short pale brown depressed pubescence between the frons and the cheeks; face mainly with dense brownish-yellow hairs and a few black ones intermixed; the pubescence near the eyes black; lower part of head with dense long whitish pubescence; eyes contiguous for some distance; occiput much puffed out, with dense dark tawny pubescence and a fringe of long black hairs posteriorly. Antennæ black; 1st joint three times as long as 2nd, with long black hairs; 2nd cup-shaped, dusted with light grey, tip ferruginous; 3rd twice as long as 1st,

* *Vide* Kertész, Kat. Dipt., for copious references.

rather flattened, style very short, 2-jointed. Proboscis blackish, as long as from tip of epistome to tip of scutellum. *Thorax* black, with dense erect pale tawny pubescence, varying in appearance according to the line of vision from greyish yellow to yellowish brown, the pubescence paler above and behind the wing-base; no black hairs on upper surface of dorsum. Upper part of pleuræ with dark rufous-tawny, nearly black, pubescence, narrowing in width towards wing-base; lower part of pleuræ with a narrow band of whitish pubescence, below which the pubescence is black. Scutellar pubescence concolorous with that of dorsum. *Abdomen* black, with long dense brownish-orange pubescence; sides of 3rd segment with black pubescence, which is broader anteriorly, extending across the venter; isolated long black hairs on hind margins of 2nd, 3rd, and 4th segments; 4th and remaining segments with numerous black hairs, scattered irregularly. Venter with whitish pubescence, crossed by the transverse band of black hairs on 3rd segment, and with a similar median longitudinal band. *Legs* dull orange; coxæ and trochanters black; fore femora (except narrowly at tip), basal half of middle pair, and basal third (less on upper side) of hind femora black; tarsi blackish, but pale on first two joints for a greater or less distance; fore coxæ with long dense brownish-white pubescence, middle pair with less dense and darker pubescence, hind pair with blackish pubescence; femora with long but not dense blackish pubescence on about basal half, also with shorter greyish pubescence merging into adpressed almost scaly pubescence; hind femora with a row of about eight long black bristles on basal half below, and smaller ones on apical half; fore tibiæ with three posterior pairs with four rows of 12 to 20 small black bristles in each row; fore tibiæ with three, middle pair with five, hind pair with a circlet of small black spurs; tarsi minutely bristly; pulvilli dirty whitish, empodium reduced to a minute spine; claws rather long, black. *Wings* clear, with an oblique baso-costal band covering the whole of the base, and extending distally in gradually but irregularly diminishing width, ending at about tip of 2nd vein. Roughly speaking, the hind border of the darkened part emits four short but not conspicuous extensions with sloping sides respectively over the alula, over upper branch of 5th vein, up to about middle of 1st posterior cell, and just before tip of 2nd vein; alar squamæ brown, margin darker, with long fringe; halteres small, orange, knob black.

♀. Mainly as the ♂ Frons at widest part about half width of head, narrower above, with long thin yellow hairs and short adpressed scaly pubescence, which latter is absent on the centre part and for a transverse space above antennæ; upper part of frons with short brownish pubescence and long black hairs. The stripe of dark hair across the lower part of pleuræ paler than in ♂, seldom blackish. The black bristles on hind borders of abdominal segments more conspicuous; anus with an outer ring of black and an inner fringe of short tawny ones.

Length, 8 to 12 mm.

The above description is compiled from Verrall's in his 'British Flies.' Typical specimens occur in the Himalayas in April and May, with others exhibiting minor variations, and the species is not at all uncommon in the Simla Hills.

208. **Bombylius erectus**, *Brun.*

Bombylius erectus, Brunetti, Rec. Ind. Mus. iii, p. 480, pl. xii, fig. 27 (1909).

♂ ♀. *Head*: frons covered with short bright yellow hairs, with two arched rows of stiff black bristles, one just above, the other just below, the antennæ, and reaching from eye to eye; sides of face with rather long, silky, cream-coloured hair; lower part of face light grey, with long snow-white hair; mouth-border reddish; antennæ black; back of head with yellow hairs; eyes bare, distinctly excavated behind in the middle. *Thorax* cinereous black, with (in semi-denuded condition) traces of a thick yellow pile, an elongated bunch of strong black bristles at the side, in front of the wings; sides of thorax with long greyish-white hairs, and yellowish hairs immediately below the wings. Scutellum ferruginous, black at base, with a row of strong black bristles round the posterior edge, with yellow hairs below it; dorsum with yellow hairs. *Abdomen* apparently blackish brown, thickly clothed with yellowish and whitish hairs, which are generally yellowish on the basal segments and apical one, and generally whitish on the others, but variable; sides of 3rd and 4th segments with thick tufts of white hairs, and the sides of the 5th segment with a tuft of black hairs, posterior borders of 2nd and subsequent segments each with a row of closely-placed, black, strong, erect spines, forming two arcs when viewed from behind; venter blackish, dorsum of segment with white pile, some black spines towards the tip. *Legs* blackish brown, with small spines and a silvery sheen seen in certain lights. *Wings* absolutely clear, extreme base slightly tawny, a small row of black bristles at base of costa; tegulæ pale yellow, with a narrow fringe of yellow hairs; halteres light brown.

Length, 8–12 mm.

Described from thirteen ♂ ♂ and twelve ♀ ♀ from Bangalore.

Types in the Indian Museum collection; co-types in the British Museum and my collection.

209. **Bombylius maculatus**, *F.*

Bombylius maculatus, Fabricius, Syst. Ent. p. 803 (1775); Wiedemann, Auss. Zweifl. i, p. 342 (1828).

♂ ♀ *Head* in ♂ black; eyes contiguous for nearly one-third the distance from vertex to antennæ, leaving a rather large vertical triangle bearing a few black hairs; the ocelli large, red, well separated; frons with elongate white or yellowish-white scales; face clothed with long snow-white bristly hairs; antennæ

black, 1st joint about 2½ times length of 2nd, with some fine yellowish-white hairs, 2nd with very few short black bristles, 3rd more than double length of 1st and 2nd together; underside of head with soft snow-white hairs; occiput with long snow-white scales. In ♀, frons forming one-third of head at level of antennæ, barely narrower at vertex; covered, as face is also, with long snow-white scales, intermixed with long white or yellowish-white bristly hairs. *Thorax* black; a pair of faint bluish well-separated narrow stripes visible on the denuded surface; dorsum covered towards all sides with narrow flat-lying hair-like scales, and a further clothing of long scale-like bristly snow-white pubescence; probably in perfect specimens the whole dorsum thus covered, possibly less densely in middle; a large fan-shaped bunch of bristly white hairs behind and below wing-base. Scutellum large, subtriangular, apparently clothed like thorax. *Abdomen* black, with microscopic flat-lying black scales and a row of dark brown bristly hairs on hind margins of 2nd and 3rd segments, intermixed on 3rd segment with long yellow bristles; 4th and 5th segments with yellow bristles on hind margins; from the 2nd segment onwards a large patch of small snow-white scales at the base towards each side, and from at least the 3rd segment onward a similar patch in the middle of each segment's hind margin; at sides of 2nd segment (*behind* the white scale-spot) and extending over the whole side of the 3rd segment (*beyond* the white scale-spot) a bunch of long dark brown bristly, almost scale-like, pubescence; black hairs surround the tip of the abdomen. *Legs* black; coxæ with long whitish bristly hairs in front; femora more or less clothed with white scales, tibiæ with traces of them *Wings* clear; costal cell yellowish, whole base of wing as far as humeral cross-vein dark brown; some white scales at base of costa in addition to the usual patch of dark brown ones; thoracic squamæ dark brown, with a long fringe of snow-white bristly pubescence; alar squama and adjoining hind margin of wing for a short distance with small pale brownish or yellow scales; halteres black.

Length, 6–7 mm.

Redescribed from one ♂ and two ♀ ♀ in the Indian Museum from Chatrapur, and Balighai, near Puri, 16–20. viii. 1911. Specimens seen from Bellary, 31. viii. 1912, and Coimbatore, S. India, 1. vii. & 7. viii. 1912 (*Fletcher*).

Type in Fabricius's collection.

210. **Bombylius comastes,** *Brun.*

Bombylius comastes, Brunetti, Rec. Ind. Mus. iii, p. 225 (1909).

♂ *Head* with eyes contiguous for a short distance (about 10 facets); vertex blackish grey, with erect long stiff black hairs, ocelli shining brownish yellow; frons densely covered with long black bristles, a small patch of elongate snow-white scales on each side contiguous to upper eye-margin; face with long black bristles

and an elongate patch of very long snow-white scales running somewhat diagonally across each side from eye-margin nearly to centre of face; antennæ black, 1st joint with long bristly pubescence; mouth-opening large, grey, with some short pale hairs on margin; proboscis black, as long as abdomen; occiput black, some small snow-white scales on eye-margins; vertex with a bunch of long black hairs. *Thorax* velvet-black, with a thick collar on anterior margin of elongate yellowish scales; rest of dorsum with very dense dark brown pubescence of moderate length, some whitish pubescence along hinder margin. Scutellum covered with very small scales, which appear bright emerald-green or pale violet according to the direction of the light. A tuft of long snow-white scales behind wing-base. *Abdomen* black, with (apparently) long dark brown bristly pubescence on dorsum towards and on sides, where it becomes much longer, thicker, and almost scaly; a small tuft of snow-white scales towards sides at base of 2nd segment; 4th segment with a bunch of very long snow-white scales towards each side at base, and a smaller bunch in centre on hind margins of 4th, 5th, and 6th segments. Venter black, with rather long soft whitish hairs in the centre and (apparently) some small snow-white scales; rather bare towards sides, but the very long pubescence of the dorsum and actual sides of the abdomen curve under the venter to some extent. *Legs* dark brown or black; coxæ with yellowish-grey hairs; femora and tibiæ with numerous small glistening snow-white scales; soft hairs below anterior femora; hind femora and posterior tibiæ with spiny bristles. *Wings* quite clear, costal and subcostal cells yellowish; halteres black; squamæ yellowish, with short white fringe; veinlet closing 1st posterior cell in a straight line with discal cross-vein.

♀ Head as broad as thorax; frons dark olive-brown, distinctly but not greatly narrower at vertex than at level of antennæ, where it forms one-third the width of the head, apparently covered in good specimens with small snow-white scales; face with long brilliantly snow-white scales; 1st antennal joint with rather long black pubescence, softer than in ♂; two oval callus-like elevations on frons, contiguous to eyes and vertical triangle; occiput more thickly covered with longer snow-white scales than in ♂; ocelli bright red. Dorsum of thorax covered with very small, brilliantly shining, emerald-green depressed scales with violet reflections; a patch of small snow-white scales behind the humerus and below the wing-root; two or three such patches of scales on pleuræ; with rather long yellowish pubescence intermixed; dark brown pubescence of dorsum sparse; scutellum covered with small emerald-green scales with violet reflections and some rather long black pubescence. Abdomen black, whole surface closely covered with very small brilliantly shining violet scales, showing a bronze tint in certain lights, also a row of stiff black hairs towards hind border of each segment. In all else as in ♂

Length, ♂ 7–8; ♀ 5 mm.

Redescribed from two ♂ ♂ and one ♀ in the British Museum from the Bombay Presidency (*E. B. Fry*), and the original type in the Indian Museum.

211. **Bombylius albosparsus,** *Big.*

Bombylius albosparsus, Bigot, Ann. Soc. Ent. France, (7) lxi, p. 362 (1892).

♂ Antennæ black, facial pubescence thick, silvery white; frons black, with silvery pile, and two small tufts of the same colour. The whole body velvety black, anterior part of thorax with dense short grey pubescence. Abdomen with numerous white hairs intermixed, tip with long thick white hairs. Halteres and legs black; wings nearly clear.

♀ (denuded) like ♂ Frons wide, with four spots formed by silver pile; proboscis longer than head and thorax together.

Pondicherry. Length, 5½ mm.

Type in the Bigot collection.

212. **Bombylius vicinus,** *Brun.*

Bombylius vicinus, Brunetti, Rec. Ind. Mus. ii, p. 480 (1909).

♀ This species is so closely allied to *terminalis* that I had almost decided to regard it as the ♀ of that species. The differences, however, appear sufficient to be specific. The hair on the front is more whitish, that on the back of the head uniformly greyish yellow, very dense, the posterior orbit of the eyes is snow-white with minute white hairs; first antennal joint pale yellow, second somewhat lighter than in *terminalis*; base of proboscis yellow. The hairs on the thorax appear whiter, those on the sides and underside being quite white. The scutellum, posterior portion of the thorax, and the abdomen are covered with rather short brownish-yellow hairs. Some white hairs at the base of the abdomen at the sides and a few white hairs at the tip, but no snow-white pile at the tip of the abdomen. Legs as in *terminalis.*

Length, 4 mm.

Described from a unique ♀ in the Pusa collection from Allahabad, 3. iv. 1906 (*Howlett*).

213. **Bombylius terminalis,** *Brun.*

Bombylius terminalis, Brunetti, Rec. Ind. Mus. ii, p. 479 (1909).

♂ *Head* with vertex of moderate size, dark grey; eyes contiguous for two-thirds of the distance from the vertex to the antennæ, reddish brown. Antennæ wholly black; 1st joint longer than 2nd; 3rd nearly double the 1st and 2nd together, bearing a short, minute bristle; 1st and 2nd joints with pale hairs. Frons and face with yellowish hairs, and snow-white pile around the antennæ, lower part of head white, with white hairs;

proboscis black, 3 mm. long; back of head with short yellowish hairs above and white hairs below. *Thorax* thickly clothed with yellowish-grey hairs; scutellum similar, the dark body-colour being visible through the hairs on both thorax and scutellum; sides of thorax with similar hairs, which become whitish on the underside. *Abdomen* with thick yellowish-grey hairs, which are thinnest on the dorsum and thickest at the sides, becoming whitish towards the tip of the abdomen, the last two segments of which are covered with brilliant snow-white silvery pile and some whitish hairs; venter with yellowish-grey hairs, white towards tip. *Legs* pale yellow, the femora and tibiæ showing a slight whitish reflection in certain lights; tips of all the tarsi black, the hind tarsi mainly brownish; a few soft hairs below the femora and a row of about six well-separated spines on underside of hind pair; tibiæ with minute spines, which are longest on hind pair. *Wings* clear, veins towards base yellowish; discal transverse vein placed at one-third of the discal cell; first posterior cell closed half-way between border and origin of fork of fourth longitudinal vein; halteres yellowish white.

Length, 5 mm.

Described from a ♂ in the Pusa collection, captured by Mr. F. W Howlett at Allahabad, 3. iv. 1906; a second ♂ from Lahore, iii. 1908.

So far as his brief description goes, my species agrees fairly well with Bigot's *albosparsus*, but he distinctly says "legs and halteres black," which makes it appear to be a different species.

214. Bombylius fulvipes, *Big.*

Bombylius fulvipes, Bigot, Ann. Soc. Ent. France, lxi, p. 362 (1892); Brunetti, Rec. Ind. Mus. ii, pp. 457, 478 (1909).

♀ *Head*: frons at the level of the antennæ occupying one-third the width of the head, narrowing at vertex to one-fourth, clothed with short golden-yellow pubescence and some longer brownish-yellow hairs; underside of face with rather close golden-yellow hairs of moderate length; mouth-border bright lemon-yellow, with moderately long yellow hairs. Antennæ black; 1st joint rather long, sub-cylindrical, widening gradually to the tip, with some long yellow hairs on outer side; 2nd joint sub-cylindrical, barely half as long as the 1st, with short black hairs; 3rd joint twice as long as 1st, bare, partly flattened vertically, and "pinched" just before the middle, terminating in a very short whitish blunt style. Ocelli on a small prominence on the absolute vertex, equidistant; eyes black, bare, facets small, uniform; back of head covered with rather long bright yellow hairs. *Thorax* covered with rather long yellowish-grey hairs, extending entirely over the sides and scutellum; ground-colour of both dorsum and scutellum black. *Abdomen* densely covered with pale yellowish-grey hairs, which become whitish on the tip; ground-colour blackish; venter with close, pale yellowish-grey hairs. *Legs*: coxæ closely clothed

with yellowish-grey hairs; femora, tibiæ, and base of tarsi pale tawny; extreme base of femora and apical half of tarsi black; anterior femora with only a very little soft hair below, hind pair with a row of six or seven moderately strong black spines below; all the tibiæ irregularly beset with short black bristles, which become spinose on the hind pair; and all the tibiæ have a circlet of very short black spines at the tip. *Wings* hyaline; upper basal cell only a little, but distinctly longer than the lower one; costal cell and base of wing as far as the origin of the basal cells tawny yellowish; the colour then, gaining an admixture of blackish, extends to three-fourths of the upper and the whole of the lower basal cell, leaving the whole discal cell quite clear; thence extending to the posterior margin of the wing, filling the basal halves of the anal and axillary cells and the whole of the alulæ; the discal cross-vein is almost imperceptibly suffused. The first posterior cell is closed just before the border.

Length, 5–6 mm.

Described from a perfect single specimen in the Pusa collection, captured by Mr. F. M. Howlett at Allahabad, 19. x. 1905. Other specimens from Belgaum, Bombay, 11. ii. 1912 (*Fletcher*); Lahore, Talewaddi, 3–10. x. 1916, and Castle Rock, 11–26. x. 1916, both N. Kanara Distr. (*Kemp*).

Though I cannot be absolutely sure of the identity, I think the present specimens are almost certainly Bigot's species.

215. **Bombylius propinquus**, *Brun.*

Bombylius propinquus, Brunetti, Rec. Ind. Mus. iii, p. 226 (1909).

♂ ♀ This species closely resembles *terminalis*, mihi, but, intermixed with the yellowish-brown soft hairs on the front part of the head, are numerous long black bristly hairs; there is no snow-white pile around the antennæ; the lower part of the head is brownish yellow (not white), and without white hairs, the base of the proboscis is yellow, and there is no snow-white pile at the tip of the abdomen. The wings have a blackish-brown baso-costal band, occupying nearly half the surface of the wing; 1st posterior cell closed at some distance from the border. The proboscis is 4 mm. long; the whole insect only 5 mm.

Type in my collection; taken at Haragama, Ceylon, i. 1908.

Three in the British Museum from Trincomali, 24. ii. 1891, and Mahagany, 8. ii. 1891 and 20. xii. 1891, Ceylon (*Col. Yerbury*).

This species is also allied to *fulvipes*, Big., but the different marking of the wing at once separates them. Described originally from a ♂ in my collection from Ceylon. I stated that the all-black antennæ separated it readily from *vicinus*; but though this is the case in the type, four males from Guindy, Madras, undoubtedly belonging to the same species, show that the antennæ are normally more or less pale on at least the underside of the 1st and 2nd joints, and vary from wholly pale to blackish on the

upper side. Two ♂♂ and 1 ♀ in the British Museum bear this out.

In the ♀ the frons forms one-third the width of the head at the level of the antennæ, slightly but definitely narrower at vertex, yellowish grey, covered (as is also the face) with long silky yellowish scaly pubescence, with which on at least the frons are intermixed some black bristles; 1st and 2nd antennal joints on both upper and lower sides brownish yellow.

This species is easily distinguished from both *terminalis* and *vicinus* by the dark brown baso-costal band covering approximately half the wing.

Genus **DISCHISTUS**, *Lw.*

Dischistus, Loew, Neue Beitr. iii, p. 45 (1855).
Bombylisoma, Rondani, Dipt. Ital. Prod. i, p. 164 (1856); *nec* Rond., Arch. Zool. Modena, iii, p. 67 (1863).
Bombylosoma, Marshall, Nomencl. Zool. p. 323 (1873).
Bombyliosoma, Verrall, *apud* Scudd. Nomencl. Zool. p. 47 (1882).

GENOTYPE, *Bombylius minimus*, Schrk.; by present designation.

This genus differs from *Bombylius* solely by the 1st posterior cell being open instead of closed. *D. ardens*, Walk., has apparently not been recorded since its discovery, and must be regarded as a species requiring corroboration as really Indian. The brilliant scales of *D. resplendens* will easily distinguish it from Walker's species.

Range. Europe, Asia, Africa, South America, and Australia.

216. **Dischistus resplendens**, *Brun.*

Dischistus resplendens, Brunetti, Rec. Ind. Mus. ii, p. 481 (1909); id., *op. cit.* iii, p. 226 (1909).

♂ ♀ *Head*: face below antennæ rather prominent, black; antennæ black, very elongated, 1st joint very long, 2nd very short, both with long black hair, 3rd longest of all, flat, with parallel sides and a minute white style at tip; proboscis strong, black, as long as head and thorax together. In the ♂ the eyes are contiguous from just below the vertex nearly to the antennæ, facets very small, those above and towards the front being rather larger; the whole face is clothed with soft long greyish hairs, surrounded by a fringe of stronger long bristly black hairs placed round the inner orbit of the eyes; vertex wholly occupied by the ocellar tubercle and a tuft of long black hairs, the three ocelli being placed in contact with the eyes; underside of head with soft black and grey hairs; back of head with a thick fringe of long soft yellowish-grey hairs and a single row of long black hairs on the extreme ocular orbit. In the ♀ the frons is one-third the width of the head, black, with sparse long black hairs and with a number of small brilliant emerald-green and rose-pink scales, intermixed and lying close to the surface; these are also

very numerous on the back of the head, where the dense grey hairs are replaced by a moderately thick fringe of pale yellow hairs; face shining black, bare; mouth-border pale yellow, bare: underside of head with soft greyish-white hairs. *Thorax* and scutellum denuded, but ground-colour black, and dorsum surrounded in front, at the sides, and behind with a dense border of thick grey hairs in the ♂, or a much sparser border in the ♀; the dorsum shows signs of having been covered lightly with yellowish-grey hairs; attached to the surface of the dorsum of both thorax and scutellum are a number of small brilliant bright green scales, with a lesser number of rose-pink similar scales; both coloured scales extend numerously over the sides of the thorax. In the ♂ a quantity of soft black hairs on the sides just below and in front of the wing-insertions. *Abdomen* similar to the thorax, with similarly coloured scales. In the ♂ the shoulders have a bunch of nearly white soft hairs, with a fringe of yellow

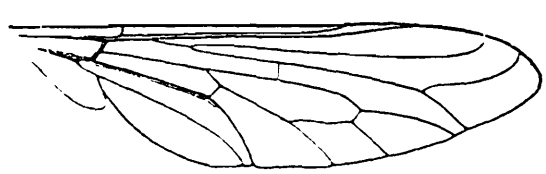

Fig. 15.—*Dischistus resplendens*, Brun., wing.

hairs between them; the sides with thick nearly white hairs. In the ♀ the shoulders have yellow instead of white hairs, and the coloured scales appear more numerous. In both sexes some long black hairs occur over the dorsum, and the venter is black, with grey hairs and a few coloured scales. *Legs* black; tibiæ and metatarsi pale brownish yellow, with short spines, hind pair darker; tarsi with rather long black bristles. *Wings* rather dark grey, brownish on anterior part; venation normal; halteres blackish; tegulæ brownish, with yellowish-grey fringe.

Length, 5–6 mm.

Described from one ♂ (type) from Dharampur, Simla Hills, 5000 ft., 6–8. v. 1907, and five ♀♀ from Sukhwani, Nepal, 15. ii. 1908, Naini Tal, 14–17. iv. 1907, and Mergue, Assam; all the specimens being in the Indian Museum. It is common at Dehra Dun in March and April; Theog, Simla Hills, 14. v. 1909; and in the British Museum from Mahagany, Ceylon, 15. ii. 1891 (*Col. Yerbury*).

217 **Dischistus ardens**, *Walk.*

Bombylius ardens, Walker, List Dipt. Brit. Mus. ii, p. 284 (1849).

"Body black, clothed with long bright tawny hairs; head clothed with brown hairs in front and about the base of the feelers, which, like the mouth, are black; the latter is more than half the length of the body; eyes piceous; legs ferruginous, clothed with black hairs and bristles; thighs darker than the

shanks; feet piceous; wings colourless, dark brown at the base and slightly so along the fore borders; the border of this brown is very oblique, and it slants towards the hinder base of the wing; its outskirts are confined to the sides of the cross-veins; wing-ribs and veins piceous; poisers tawny.

"Length of the body 3 lines, of the wings 7 lines. East Indies."

Type in the British Museum.

Genus **SYSTŒCHUS**, *Lw.*

Systœchus, Loew, Neue Beitr. iii, p. 34 (1855).

GENOTYPE, *Bombylius sulphureus*, Mikan (Europe); by Coquillett's designation (1910).

This genus differs from *Bombylius* chiefly by the two basal cells being practically equal in length, owing to the position of the anterior cross-vein near the base of the discal cell. Eyes in ♂ sometimes separated by a narrow frons. Tip of 3rd antennal joint without the small obvious style present in *Bombylius*. Pubescence of abdomen said to be longer and more ragged than in *Bombylius*.*

Range. World-wide.

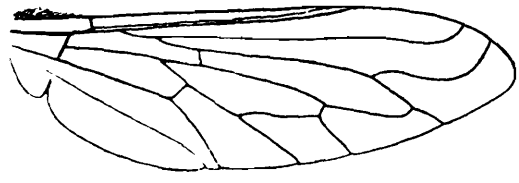

Fig. 16.—*Systœchus*, Lw., wing.

Life-history. The early stages of *S. autumnalis* and *S. oreas*, a European and North American species respectively, have been observed by Portchinsky and by Riley. The larvæ live in the egg-cases of locusts; they are whitish, cylindrical, amphipneustic, and 13-segmented, much as in *Bombylius*. The pupæ also resemble those of that genus.

Table of Species.

1. Legs with at least femora black; abdominal spines black	2.
Legs wholly or principally yellow	3.
2. Pubescence pale to bright yellow	*socius*, Walk., p. 276.
Pubescence nearly white	*nivalis*, Brun., p. 277.
3. First and 2nd antennal joints brownish yellow; femora and tibiæ wholly bright brownish yellow; abdominal spines yellow	*flavospinosus*, sp. n., [p. 277.
Antennæ all black; femora brownish.	*eupogonatus*, Big., p. 278.

* This is so in many species; I cannot vouch personally for the constancy of the character.

The distinctions between these alleged species are not at all clear. I have not seen *eupogonatus*, which may be the same as *socius*, the words "legs reddish, femora brownish" being applicable to a specimen with the femora more brown than black; whilst the rest of the description would apply quite well to Walker's species. My *nivalis* differs from *socius* only in the nearly white pubescence, and may represent only an individual variation. There may, therefore, be only two species, *socius* and *flavospinosus*, with the addition of an undescribed one in bad condition in the British Museum.

218. **Systœchus socius**, *Walk.*

Bombylius socius, Walker, Ins. Saund., Dipt. pt. 3, p. 201 (1852).
Systœchus socius, Brunetti, Rec. Ind. Mus. ii, p. 458 (1909).

♂ ♀ *Head* blackish grey; eyes in ♂ distinctly but narrowly separated at nearest point of approximation; vertex with numerous short stiff hairs; ocelli reddish; frons with long black bristly pubescence; face in ♂ with a few long whitish scales, more or less depressed, amidst numerous long dark brown bristles; in ♀, with a considerable quantity of long bristle-like whitish scales extending from eye to eye; mouth-opening with dense long blackish-brown scale-like bristles, some whitish pubescence around lower part of mouth-opening, which is itself whitish; lower part of head whitish grey, with dense elongate very thin white scaly pubescence; antennæ black, 1st joint with long dark brown bristles; proboscis black, as long as the head and thorax (not scutellum) together; back of head with very dense long bristle-like scales, varying from pale to bright yellow; lower eye-margins with whitish scales. *Thorax* black; dorsum, pleuræ, and scutellum wholly covered with dense elongate scales forming a close thick pubescence, varying from nearly whitish to deep yellow, almost orange, that below the shoulders being generally deeper in shade than that on the thoracic dorsum; scutellum with hind part always more or less reddish brown, sometimes practically entirely so; a row of yellow spines on hind margin. *Abdomen* black; densely covered with similar bristle-like pubescence to that of the thorax; a row of black spines near hind border of each segment from the 3rd onwards; venter black, with long pale yellow hair-like scales; base of some of the middle segments often reddish brown. *Legs*: femora black, with minute whitish scales; tibiæ paler or darker brown, sometimes blackish at tips, especially the hind pair; tarsi black, underside pale brown. *Wings* pale grey; base, costal cell, and the veins on basal half brownish; halteres cream-yellow.

Length, 7–11 mm.

Redescribed from several of each sex in the British and Indian Museums, the Pusa and my own collections.

This species extends from the Himalayas to Ceylon: Kashmir, 1915 (*H. T. Pease*); Dehra Dun, xi. 1907 (*Lt.-Col. Wyville*

Thomson), iv. 1914, common (*Chatterjee*); Theog, Simla Hills, 14. v. 1909; Kumaon, 18 & 27. v. 1912; Bhowali, 5700 ft., iii. 1910 (*Chatterjee*); Runjit Valley, Sikkim, v. 1894 (*Lt.-Col. C. T. Bingham*): Kangra Valley, 4500 ft., x. 1899 (*Dudgeon*); Coimbatore, 30. v. 1912; Hadagalli, Ceylon, x. & xi. 1911.

Type in the British Museum.

The colour of the pubescence is so variable that I am inclined to think my *nivalis* may be an extreme form. The proboscis in *nivalis* is distinctly longer than from the tip of the frons to the tip of the scutellum.

Mr. T. B. Fletcher finds that the larvæ prey on the eggs of the Deccan grasshopper.

219. **Systœchus nivalis,** *Brun.*

Systœchus nivalis, Brunetti, Rec. Ind. Mus. vii, p. 472 (1912).

♂ *Head* with frons and face blackish grey, darker above, both thickly covered with long black bristly hairs. Antennæ rather long, black; 1st and 3rd joints subequal, each about three times as long as the 2nd; first two joints cylindrical, 3rd much more slender on apical half. Proboscis very long, labium reaching to middle of abdomen (actually bent backwards to this distance below the body in the type), labrum shorter; palpi extremely short and slender; underside of head dark grey, with whitish hairs. *Thorax* and *abdomen* closely covered with pale yellowish grey, almost white, bristly pubescence, which is more yellowish on anterior part of former and whitish on pleuræ and apical part of abdomen; underside of thorax and abdomen with whitish hair. *Legs* black; tibiæ from the base, for the major part, brownish yellow. *Wings* pale grey, costal cell a little darker grey; base of wing a little yellowish.

Length, 9 mm.

Described from a unique ♂ in the Indian Museum from Airadeo, Kumaon Distr., Western Himalayas, 31. v. 1912 (*Imms*).

Possibly a variety of *socius*, Walk.

220. **Systœchus flavospinosus,** sp. nov.

♀: This species differs from *S. socius* only as follows:—Face wholly covered with long dense silky yellowish scales, no black bristles; 1st and 2nd antennal joints brownish yellow, 1st with some long pale hairs; 3rd rather shorter and broader basally than in *socius*; scutellum almost entirely brick-red; spines on hind margins of abdominal segments yellow, not black; femora and tibiæ wholly bright brownish yellow, tarsi gradually darkening to brown at tips.

Length, 7 mm.

One ♀ in the British Museum from the South Shan States, Upper Burma, 4000 ft., xi. 1899 (*Lt.-Col. C. T. Bingham*).

221. **Systœchus eupogonatus,** *Big.*

Systœchus eupogonatus, Bigot, Ann. Soc. Ent. France, lxi, p. 365 (1892).

"♂ Antennæ black, 1st joint covered above with long blackish hair, and below grey; face dull yellow, with grey hairs above, hairs on lower part long, black, and thick. Frons black, with long black hairs. All the body covered with thick pale yellow pubescence. Scutellum black, reddish at tip; halteres tawny, knobs whitish. Legs reddish, femora brownish, with grey tomentum. Wings nearly clear.

"♀ Frons grey, with grey pubescence; proboscis a little longer than head and thorax together. India." (*Bigot.*)

Length, 10 mm.

Types in the Bigot collection.

Genus **ANASTŒCHUS,** *O.-S.*

Anastœchus, Osten-Sacken, 'Western Diptera,' p. 251 (1877).

GENOTYPE, *Bombylius nitidulus,* F. (as *barbatus,* O.-S.) (Europe); by original designation.

This genus differs from *Bombylius* by both basal cells being of equal length. The dense furry pubescence of the underside of the head distinguishes it from *Systœchus* (which also has the basal cells subequal in length), but not from *Bombylius.*

Range. Europe, Asia, North Africa, North America, and India. Only one Oriental species has been recorded.

222. **Anastœchus longirostris,** *Wulp.*

Anastœchus longirostris, Wulp, Notes Leyd. Mus. vii, p. 85 (1885).

♀ "Small, black; pubescence of head and body white, of frons brown; abdomen with several black bristles; proboscis longer than head and thorax; legs pale yellow; wings grey, base and costa yellowish; 5½ mm.

"Near the American *A. barbatus,* O.-S. The thorax and abdomen more slender; head broader than thorax, with dense long white hairs on face and dark brown or blackish on frons. Antennæ black; terminal style of latter as long as the pyriform 3rd joint; end of style a little thickened. Proboscis black, as long as two-thirds of body. Thorax and abdomen thickly clothed with long yellowish hairs, with a white reflection, amidst which are some long black bristles on the sides of the abdomen. Legs and halteres pale rufous. Wings greyish, yellowish at base and costa; at the beginning of the costa is a comb of black-tipped yellowish hairs. Venation as in *A. barbatus.* One ♀ from the Himalayas (*Felder*)." (*van der Wulp.*)

This species is unknown to me.

Genus **GERON**, *Mg.*

Geron, Meigen, Syst. Besch. ii, p. 223 (1820).

GENOTYPE, *Bombylius hybridus*, Mg. (Europe); by original designation.

Head semicircular, narrower than thorax and set low down on it; epistome short; mouth-opening large; proboscis prominent, horny, curved, with narrow labella; eyes in ♂ contiguous, widely separated in ♀ Antennæ porrect, approximate at base, longer than head; 1st joint long, cylindrical; 2nd very short; 3rd as long as 1st, spindle-shaped. *Thorax* oval, considerably arched, projecting forward; thinly pilose or with microscopic tomentum; scutellum triangular. *Abdomen* extremely short, conical, tip pointed, thinly pilose. *Legs* slender, minutely pubescent. *Wings* with 3rd longitudinal vein forked; anterior cross-vein beyond middle of discal cell, erect; two submarginal cells; three posterior cells; anal cell nearly reaching border of wing; anal vein attaining the border.

Range. World-wide.

Life-history unknown.

The two Indian species are thus distinguished:—

Legs pale brown; tibiæ paler; length 2½–4 mm.	*argentifrons*, Brun.
Legs pale tawny; coxæ, tips of femora, and hind tarsi black; length 5 mm.	*albescens*, Brun.

223. **Geron argentifrons**, *Brun.*

Geron argentifrons, Brunetti, Rec. Ind. Mus. ii, p. 482 (1909).

♂ *Head* with eyes contiguous from the very reduced raised vertex to antennæ, facets of moderate and uniform size; vertex with several long black hairs of variable lengths; ocelli well separated, pale brown; frons covered with dull yellowish oblong scales, lying flat on surface, and with a second clothing of silvery-white scales; face bluish white, with silvery reflections seen from above, as are also the lower eye-orbits; some long black hairs on face; upper side of mouth-opening yellowish; occiput black, with long brownish-grey hairs. Antennæ black, tip of 1st and 2nd joints sometimes very narrowly whitish, 1st joint about double as long as 2nd; 3rd distinctly longer than first two together; basal joints occasionally pale. *Thorax* black, with long brownish-grey or yellowish-grey pubescence, through which can be seen a lower clothing of very short yellow scale-like hairs; pleuræ bluish grey, with whitish-grey pubescence. *Abdomen* dorsally like thorax, sides with numerous silvery-white scale-like hairs; apparently the whole dorsum normally covered with long hairs, which may be thicker and longer at the sides; venter like dorsum, except that the long hairs are a little shorter. *Legs* normally dark brown or blackish; tibiæ always paler, varying in shade from yellowish to moderately dark reddish brown; femora apparently

(and probably coxæ also) covered with small silvery-white scales; tibiæ with small yellowish scales, short black spines and a circlet of them at tips, which are a little darker; tarsi black, with usual pubescence, metatarsi partly or almost wholly pale. *Wings* quite clear, iridescent; veins pale yellow; squamæ pale yellow, with short hairs; halteres large and prominent, clubs egg-shaped, from nearly white to bright yellow.

♀ Frons at vertex forming one-fourth the width of the head, covered with bluish-grey dust and with very small yellow or yellowish-white scales; a cluster of silvery-white scales around base of antennæ; face as in ♂, except that the long hairs are white, not black. Underside of first two antennal joints pale. Posterior femora and apical part of fore pair, also all the tibiæ, pale yellowish.

Length, 2½–4 mm.

Redescribed from type ♂ from Lahore, 9. v. 1908 (*Annandale*), and three other ♂♂, also three ♀♀, all (except type ♂) from Pusa, Bengal (*Howlett*, etc.), where it is common, March to May. Also from Almora, Kumaon Distr., 5500 ft., v–vi. 1911 (*Paiva*); Parel, Bombay Presid., 26. xi. 1909. In the British Museum from four places in Ceylon, Trincomali, x. 1890, and Nilavelli, 31. viii. 1890 (*Col. Yerbury*); Pundaluoya, ii. 1898 (*Green*); Madulsima, 19. v. 1908 (*T. B. Fletcher*).

This species is parasitic on caterpillars found under the bark of the sissoo-tree (*Dalbergia sissoo*); it also occurs on the pipal.

Types in the Indian Museum.

224. **Geron albescens**, *Brun.*

Geron albescens, Brunetti, Rec. Ind. Mus. iii, p. 229 (1909).

♂ *Head* black; eyes contiguous almost to antennæ, frontal triangle extremely small, upper facets slightly larger than lower ones; vertex elevated, small, with a few short black hairs; ocelli

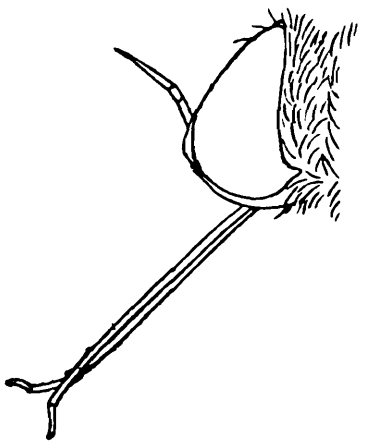

Fig. 17.—*Geron albescens*, Brun.; lateral view of head.

red; mouth black, grey bordered; face small, squarish, black, with some snowy-white scales on each side of base of antennæ;

proboscis black; antennæ black, relative length of joints as in *argentifrons*, tips of first two joints narrowly pale, with greyish hairs; occiput black, with long yellow hairs above and greyish ones below; hind margin of eyes with small white scales. *Thorax* velvet-black, dorsum covered with bright yellowish hairs, which are greyish on the grey shoulders; underside ash-grey, with long grey hairs and some grey scales; scutellum black, yellow-haired. *Abdomen* black, with minute bright yellow fine scales and hairs; hind margins of segments with long deflexed grey hairs; whole dorsum with long thin greyish pubescence, which is denser at the sides; venter wholly covered with small silvery-white scales and long grey hairs. *Legs* with coxæ and fore femora black, former with grey hairs; posterior femora and all tibiæ pale tawny; tarsi black, middle metatarsi more or less pale at base; legs almost

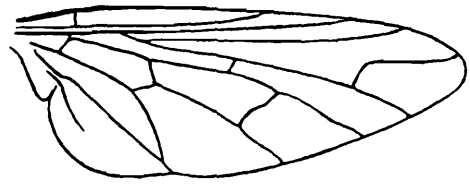

Fig. 18.—*Geron albescens*, Brun., wing.

bare except for a few short hairs below femora and the usual minute tibial bristles. *Wings* quite clear, veins pale yellowish on basal half; halteres yellowish, knobs bright pale yellow.

Length, 5–8 mm.

Redescribed from the original type from Balugaon, Puri Distr., Orissa, 14. xii. 1908 (*Caunter*), and a second ♂ from Tambi, Satara Distr., Bombay, 2100 ft., 22–26. iv. 1912 (*Gravely*), both in the Indian Museum.

The only definite character by which this species differs from *argentifrons* seems to be the pale posterior femora in the ♂ and the larger size.

Genus **USIA**, *Latr.*

Usia, Latreille, Hist. Nat. Crust. Ins. xiv, p. 300 (1804).
Volucella, Fabricius (*nec* Geoff.), Ent. Syst. iv, p. 412 (1794); id., Syst. Antl. p. 114 (1805); Meigen, Klass. i, p. 194 (1804).

Genotype, *Volucella florea*, F. (Europe); by Rondani's designation.

Rather small bare or nearly bare flies, sometimes of metallic ground-colour, sometimes with yellow and black markings. *Head* hemispherical, small, set rather low on the thorax; epistome short, proboscis prominent, at the base membranous, apical part horny with extremely narrow labella; palpi short, united to the basal part of the membranous portion, which is entirely withdrawable within the mouth-border. Antennæ short, porrect, hardly longer than head, approximate at base; the first two joints subequal; 3rd elongate, spindle-shaped above, blunt, with spines

and a short apical style. Eyes in both sexes normally distant, but sometimes contiguous in ♂ *Thorax* oval or nearly rounded, arched; scutellum short and broad. *Abdomen* of seven segments, short oval, broader than thorax. *Legs* rather stout, bare, without spicules. *Wings* in rest, half open; venation as in *Geron*.

Range. Europe, Asia, North Africa.

Life-history unknown.

The two Indian species are distinguished as follows:—

Thorax with two or three elongate light grey spots on anterior margin	*sedophila*, Brun.
Thorax with anterior margin broadly light grey, produced posteriorly as four short stripes	*marginata*, Brun.

225. **Usia sedophila**, *Brun.*

Usia sedophila, Brunetti, Rec. Ind. Mus. iii, p. 227 (1909).

♂. *Head*: vertex prominent, black, shining, with a few erect long hairs; ocelli distinct, whitish; eyes black, bare, contiguous for more than half the distance from vertex to antennæ; facets in front and above distinctly larger than those behind and below, but no distinct dividing line. Antennæ black, bare, except for an occasional hair; first two joints short; 3rd somewhat flattened, but thick and slightly curved, elongate, and with a peculiar notch towards the tip on upper side, in which is a single hair. Proboscis about twice the length of the head, black, cylindrical, stiff, straight, bent upwards at tip, bare, except for a few minute hairs at tip; face dark greyish, with some stiff black hairs on each cheek, and

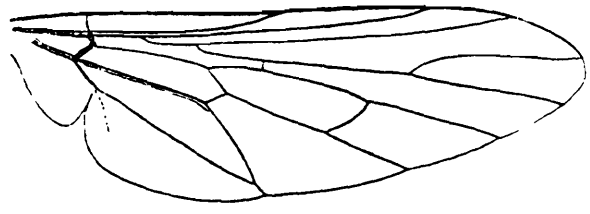

Fig. 19.—*Usia sedophila*, Brun., wing.

a long elevated shining black callus between the median line and the eye-margins; back of head black, not produced behind margins of eyes, with long sparse black hairs, continued on underside of head. *Thorax* dull black, velvety on dorsum, with some black and pale hairs towards the sides, and three whitish-grey elongate spots on anterior border, of which the middle one is often absent, and the outer ones are occasionally indistinct or absent also; lower part of thorax more or less dark grey; scutellum black, with some erect light tawny hairs. *Abdomen* dull black, conical; 1st segment narrow, wholly black; the remaining six broader, but of diminishing length and breadth to the tip, and with a rather bright yellow narrow posterior border to each segment; dorsum

comparatively bare, but the sides of the abdomen with pale yellow hairs. Genitalia small, inconspicuous, conical, blackish. Venter blackish, posterior margins of segments whitish grey. *Legs* uniformly black, very shortly pubescent; femora with some soft hairs; hind tibiæ with short bristles. *Wings* nearly clear; subcostal cell pale yellow; venation normal; halteres dark brown or blackish, knobs large.

♀. *Head*: eyes separated by a wide frons equalling one-third width of head; upper half of frons, as also whole back of head, greyish yellow, the latter with black hairs as in ♂; upper half of frons with a row of hairs near margin of eyes; vertical triangle distinct, dark, two narrow fuscous vertical lines from the vertical triangle to an irregular transverse dark streak dividing the upper from the lower half of the frons, the latter part being more ash-grey and unmarked; lower part of the head greyish; proboscis and mouth larger than in ♂, thus narrowing the cheeks considerably. *Thorax* yellowish grey, with a median pair of narrow fuscous lines, with a broader outer stripe, more or less divided into three spots, the anterior one small and conical, the other two more elongate; also an indistinct central line between the median pair of narrow ones, and a small spot above the insertion of the wings; sides of thorax cinereous grey; scutellum yellowish grey, with some yellow hairs as in ♂ *Abdomen* black, bare; posterior margin of segments rather broadly yellow; sides with a little less hair than in ♂; venter blackish; ovipositor pale yellow, inconspicuous. *Legs* and *wings* as in ♂

Length, $2\frac{3}{4}$–$3\frac{1}{2}$ mm.

Described from several of both sexes taken by Dr. Annandale at Simla, 16. v. 1909, where it was common on *Sedum rosulatum* (white stonecrop); the species was not seen anywhere except on this plant. Phagu, 18–21. v. 1916 (*Annandale*).

Types in the Indian Museum.

226. **Usia marginata**, *Brun.*

Usia marginata, Brunetti, Rec. Ind. Mus. iii, p. 228 (1909).

♂ *Head* with eyes contiguous for a shorter space than in *sedophila*, black, bare; upper facets larger than lower, and more sharply defined from one another than in *sedophila*; frons ash-grey, small, with a few black hairs; vertex prominent, with some black hairs, ocelli distinct; front margins of eyes and cheeks with long black hair, which is considerably thicker on the underside, and which extends over the whole of the back of the head. Antennæ as in *sedophila*, but the third joint with a pale ring at the base, giving the appearance of a minute basal joint, and the tip bears on its upper side a minute style-like process, just beyond the subapical depression; 1st joint with some bristly black hairs, 2nd with one or two minute hairs, 3rd bare. *Thorax* dull black, almost velvety, covered lightly on dorsum, and more thickly

in front and at sides with long black hairs; anterior margin of thorax broadly whitish grey, which in the centre is produced posteriorly into four narrow stripes, of which the outer pair just reach the suture, the inner pair being very slightly shorter; sides of thorax black, with long black hairs, and the whitish-grey colour of the anterior margin of dorsum extends downwards somewhat below the shoulders. *Abdomen* dull black, posterior margins of segments narrowly yellowish, with the colour continued over the sides and across the venter; a row of grey hairs on posterior border of segments, and the sides of the abdomen with rather thick whitish-grey hairs; venter concolorous. *Legs* black, minutely pubescent; femora with rather long soft black hairs on upper and lower sides; hind tibiæ very shortly bristly. *Wings* nearly clear; subcostal cell very pale yellow; halteres pale brown, clubs chalk-white.

Length, 4 mm.

Described from one ♂ taken by Dr. Annandale at Simla, 16. v. 1909, in company with the previous species. A second specimen with the same data; both in the Indian Museum.

Genus **PHTHIRIA**, *Mg.*

Phthiria, Meigen, Illig. Mag. ii, p. 268 (1803).
Megapalpus, Macquart, Hist. Nat. Ins., Dipt. i, p. 394 (1834).
Dasypalpus, Macquart, Dipt. Exot. ii, pt. 1, p. 112 (1840).
Cyclorhynchus, Macquart, Dipt. Exot. ii, pt. 1, p. 114 (1840) *preocc.*
Phtyria, Rondani, Arch. Zool. Modena, iii, p. 65 (1863).
Pœcilognathus, Jaennicke, Abh. Senck. Nat. Ges. vi, p. 350 (1863).

GENOTYPE, *Bombylius pulicarius*, Mikan (Europe); by original designation.

Head in ♂ nearly semicircular, in ♀ nearly circular, not broader than high viewed from in front, about as wide as thorax; face broad but short down the middle, because the large and rather wide mouth-opening extends up between the wide side cheeks; frons in ♀ broad, depressed in the middle; three ocelli; eyes in ♂ contiguous or subcontiguous, in ♀ wide apart. Proboscis long, thin, almost bristle-like, directed forwards in a slight arch, labella very small; palpi rather short and thin. Antennæ porrect, shorter than head, approximate at base; 1st and 2nd joints short, subequal in length; 3rd elongate, peg-shaped, with a terminal style (sometimes indistinct). *Thorax* oval, longer than broad, slightly arched, in ♂ with fairly long erect dense pubescence, without bristles; in ♀ with only short depressed pubescence; pleuræ with only slight pubescence, except for a rather dense tuft on the mesopleuræ; metapleuræ bare; scutellum large, semicircular. *Abdomen* 7-segmented, conical in ♂, ovate and rather flattened in ♀; pubescence as on the thorax in ♀ *Legs* long and thin, entirely without bristles except for some tiny spicules on the hind tibiæ. *Wings* longer than abdomen; 1st basal cell

considerably longer than 2nd, 3rd vein forked, the 2nd submarginal cell elengate; anterior cross-vein at about middle of discal cell; anal cell closed just before wing-border.

Range. World-wide.

Life-history unknown.

The adults occur on bare patches of ground among low-growing flowers, and on Compositæ.

227. Phthiria gracilis, *Walk.*

Phthiria gracilis, Walker, Ins. Saund., Dipt. pt. 3, p. 194 (1852).

♂ ♀ *Head* in ♂ black; vertex very small, dark grey, with three or four short black hairs; ocelli dark ruby-red, shining; eyes closely contiguous for nearly all the distance to the small protruding triangular dark grey frons, which bears a few black hairs; mouth-opening extremely large, extending from immediately below base of antennæ to lower part of head, black; face and under part of head black, both with long black hairs; antennæ black; 1st and 2nd joints as long as wide, subglobular, with two or three short black hairs each, 3rd joint narrower, flattened, about two and a half times as long as first two together, with microscopic depressed pubescence and a short style-like prolongation at tip on upper side; proboscis as long as whole body, black, slender, gently curved; palpi half as long as head, porrect, black. Head in ♀ bright orange-yellow; frons at vertex about half as

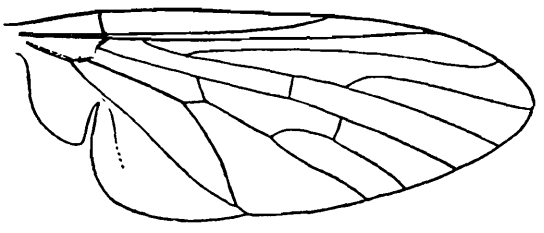

Fig. 20.—*Phthiria gracilis*, Walk., wing.

wide as at level of antennæ, where it forms nearly one-third the width of the head; a broad black stripe from vertex to above antennæ, sometimes wholly interrupted in middle; ocelli distinct; sides of face between antennæ and eyes blackish; occiput black, broadly orange behind eye-margins, the colour not extending behind the vertex. *Thorax* in ♂ dark blackish brown, with a little short dark brown pubescence, which is longer towards the sides of the dorsum; scutellum concolorous. In ♀ greenish grey, lower margin of dorsum rather broadly though somewhat irregularly pale yellowish; scutellum yellow, with a small blackish spot at base. *Abdomen* in ♂ black, with long black hairs, hind margins of basal segments more or less narrowly yellow. In ♀ yellowish, with short, brown, not very obvious pubescence; base of segments

more or less broadly blackish, the colour confined to the middle of the disc on the basal ones, but extending to nearly or quite the full width in the others. Venter and genitalia in both sexes black, with some soft hairs. *Legs* in ♂ all black; in ♀ yellowish; hind pair and anterior tarsi blackish; all legs devoid of pubescence, except for a few short hairs below tip of posterior femora. *Wings* brownish in ♂, very pale grey in ♀, almost clear; subcostal cell yellowish for some distance from tip; halteres yellowish, knobs blackish; thoracic squamæ very large, yellowish, with a fringe of pale hairs.

Length, 4–5 mm.

Redescribed from one ♂ and three ♀ ♀ from Simla, x. 1908 (*F. M. Howlett*).

Type in the British Museum.

Subfamily TOXOPHORINÆ.

Head moderately transverse, rounded behind eyes, as wide as or a little wider than thorax, generally considerably depressed. Eyes in ♂ contiguous or subcontiguous, the front facets sometimes enlarged, no indentation in middle of hind margin; in ♀ widely separated. Face usually produced over the long narrow mouth-opening; proboscis generally long, slender, or short and thick in some (non-Oriental) genera (*Cyllenia*); palpi long and thin in *Toxophora*, short in some genera. Antennæ closely approximate at base, porrect, as long as or longer than head. Vertex with a pair of strong bristles in *Toxophora*. *Thorax* very humped, with scaly pubescence in some genera and strong side bristles in *Toxophora*; scutellum rather large and with strong marginal bristles in *Toxophora*. *Abdomen* tubular and elongate, much curved downwards, so that the whole body seen in profile forms nearly half a circle. *Legs* with strong bristles behind hind femora in most genera, but on apical half only in *Toxophora*; there are some exceptions. Tibiæ generally with conspicuous bristles or spicules on hind pair. *Wings* with the 2nd longitudinal vein looped or not near its end; two or three submarginal and three or four posterior cells; anal cell closed at some distance from the border in *Toxophora*, open in some genera. Alulæ and hind angle of wing well developed in *Toxophora*, weak or absent in some genera; squamæ generally with only a slight fringe, but *Toxophora* has a long rigid one.

The principal characters of this subfamily are the structure of the antennæ, the usually humped thorax, the long narrow abdomen, and three posterior cells. The limits of the group are not well defined, and the species all appear to be uncommon.

Genus **TOXOPHORA**, *Mg.*

Toxophora, Meigen, Illig. Mag. ii, p. 270 (1803).

GENOTYPE, *Asilus maculatus*, Rossi (Europe); by Meigen's designation (Klass. 1804, p. 273).

Head semiglobular, as broad as thorax, placed low on it; epistoma short; proboscis porrect, horny, with narrow labella; palpi long, filiform, thicker at base. Antennæ very long, prominent, horizontal, approximate at the base; 1st joint cylindrical, as long as 2nd and 3rd together; 2nd cylindrical, about half as long as 1st; 3rd shorter than 2nd, awl-shaped. Eyes in ♂ contiguous, in ♀ wide apart; three ocelli. *Thorax* oval, extremely arched, hump-backed; scutellum broad and short. *Abdomen* a little narrower than thorax, 7-segmented, elongate, conical, arched downwards, pointed at tip; generally with yellow or whitish transverse bands. *Legs* rather stout, moderately long; tibiæ strongly bristly; tarsi with two pulvilli. *Wings* with 3rd vein forked abruptly; three submarginal cells, three posterior cells; 1st basal cell much longer than 2nd; anterior cross-vein at or just beyond middle of discal cell; anal cell closed just before border; alula rather small.

Range. South Europe, Asia, Africa, North and South America.

Life-history unknown.

These are moderately large, slightly pubescent, rather bristly flies of a peculiar hump-backed appearance, closely covered with scales on many parts of the body.

228. **Toxophora javana**, *Wied.* (Pl. III, fig. 16.)

Toxophora javana, Wiedemann, Dipt. Exot. p. 179 (1821); id., Auss. Zweifl. i, p. 363 (1828); de Meijere, Tijd. v. Ent. liii, p. 66 (1910); Brunetti, Rec. Ind. Mus. ii, p. 458, pl. xii, fig. 28 (1909).

♂ ♀. *Head* in ♂ with eyes contiguous nearly to antennæ, leaving a small protruding frons concealed by the bunch of long thin bright yellow scales surrounding base of antennæ; vertex very small, black, with a pair of strong ocellar bristles; face blackish, with a white shimmer seen from above; mouth-orbit whitish; proboscis about 1¾ times length of head; antennæ over twice length of head, 1st joint about as long as 2nd and 3rd together, black, covered with very small brown scales lying close on the surface, and, at least on 1st joint, with more elongate and less depressed silvery scales, on 2nd joint a number of elongate dark brown scales, on 3rd a considerable amount of dark brown hairs; occiput black, whole middle part with dense elongate conspicuous bright chrome-yellow scales, which extend laterally to the eye-margins, and sometimes are continued upwards behind the eye; below these scales is a clothing of very small oblong pale brown scales resting flat on the surface, apparently entirely covering it; on lower part of occiput a large bunch of very elongate bristle-like yellow or whitish-grey scales. In ♀, frons

at vertex about one-fifth of the greatest width of the head, broadening distinctly to base of antennæ. *Thorax* black, with a coating of very small oblong brownish scales lying flat on the surface, and a further clothing of dense short bright chrome-yellow hair-like scales covering (presumably) the entire thoracic and scutellar dorsum, this vestiture being a little shorter and longer towards the sides; pleuræ covered (apparently entirely) with similar scales of greyish-white colour. *Abdomen* black, with a layer of small brownish scales as on the thorax, and a clothing of closely-placed, moderately elongate, yellow overlapping scales, evidently covering the entire dorsum and sides in perfect specimens; sides of 2nd segment with four or five long, slightly curved, yellow bristles. Venter bearing at least a broad median stripe of similar scales, which are greyish white; hind margins and sides of all the segments with small bright yellow scales; whole venter sometimes covered with small whitish scales, more densely so on hind margins of segments. *Legs* black; coxæ with white scales on front sides, hind pair with three long yellow bristles on outer sides; femora and tibiæ closely covered with small brown scales as on the body; anterior femora on hinder and undersides, hind femora on outer and undersides, with small overlapping silvery-white scales; hind pair with a few small black bristles below; tibiæ with several rows of strong bristles, outer sides with small depressed whitish scales, their extent apparently variable; all tibiæ on inner side with a row of rather longer, dark brown, somewhat outstanding scales, and with a circlet of apical spines; tarsi black, with short black bristles below. Under moderate microscopic power the whole surface of the tarsi is seen to be covered with extremely minute black scales. *Wings* grey, more or less brownish on anterior part, sometimes distinctly so as far hindwards as the 4th longitudinal vein; sometimes the colouring much restricted or almost entirely absent, leaving only the transverse veins slightly suffused; halteres pale brownish yellow; thoracic squamæ whitish, with a long fringe of white hairs.

Length, 5–6 mm. (excl. antennæ).

Redescribed from one ♂ in the Pusa collection (Allahabad, *Howlett*) and one ♂ and three ♀♀ in the Indian Museum, Calcutta, 7 v. 1907 (*Caunter*), 7. vii. 1907; Allahabad, 21. ii. 1906 (*Howlett*); Guindy, Madras (*Capt. Cragg*). De Meijere records it from Krakatua, Java.

Type in Westermann's collection.

The colour of the body-scales in this species is sometimes uniformly bright yellow and sometimes wholly snow-white; in some specimens scales of both colours are present in variable proportions, those on the thorax and forming a broad median stripe on the abdomen being yellow, whilst those on the pleuræ and sides of the abdomen are white. Probably in perfect specimens the whole thorax and abdomen are covered with scales; but when a specimen is partly denuded, the form usually taken is of a median and lateral stripes of scales and more or less complete transverse bands of them on the hind margins of the segments.

Subfamily SYSTROPINÆ.

Head distinctly transverse, occiput excavated, bare; three ocelli on small but distinct tubercle; neck short; eyes in both sexes contiguous, bare (with rare exceptions), no indentation at middle of hind margin, front facets in ♂ rather larger than in ♀ Frontal triangle small, bare; face narrow, one-sixth width of the head at its upper and lower part, and narrowing to one-eighth of the head in its middle, bare. Mouth-opening long and narrow, extending nearly to the antennæ; proboscis long, slender, porrect, from as long as, to twice the length of the head; palpi small. Antennæ very elongate, thin, porrect, as long as head and thorax together, closely approximate at base and barely diverging till the end of the very long 1st joint, which forms half the full length of the antennæ; 2nd joint one-third of 1st; 3rd wider, cigar-shaped, with no style or arista. *Thorax* much arched, especially in front, nearly bare, no bristles, a large prealar depression on each side; sides of thorax bare or with slight tomentum; scutellum rather small, sloping; metanotum concealed, except a peculiar pale-coloured membranous tubercle on each side. *Abdomen* very long and thin, cylindrical, 9-segmented in ♂, 8 in ♀, bare. Genitalia in ♂ rather knob-like, in ♀ sharply compressed. *Legs* comparatively short and thin; hind pair much longer and rather thicker; legs generally bare, except for three rows of spicules and a few short spurs on hind tibiæ, and some "plantar"* spines on the tarsi. In some species there is a spine below the middle of the hind femora. *Wings* with anterior cross-vein beyond middle of discal cell; two, rarely three, submarginal cells; three posterior cells, always open; 3rd longitudinal vein widely forked; anal cell closed; alulæ absent, base of wing cuneiform; tegulæ absent or minute; halteres long and conspicuous.

The affinities of this subfamily are not definite, there being no close relationship to any of the others. Only two genera and about forty species are known. The extremely long attenuated abdomen and long thin hind legs, three posterior cells, elongate antennæ, and bare body characterise them.

Genus **SYSTROPUS**, *Wied.*

Systropus, Wiedemann, Nova Dipt. Gen. p. 18 (1820); Loew, Fauna Südafr. p. 200 (1860).
Cephenes and *Systrophus*, Latreille, Fam. Natur. p. 496 (1825).
Cephenus and *Systrophopus*, Karsch, Zeits. f. d. ges. Naturw. liii, p. 656 (1880).
Xystropus, Verrall, *apud* Scudd. Nomencl. Zool. p. 355 (1882).

GENOTYPE, *Systropus macilentus*, Wied. (S. Africa); by original designation.

Body extremely attenuated, with long narrow wings and comparatively short anterior legs, hind legs very long; practically

* I quote Verrall here.

bare species. *Head* as broad as or broader than thorax; eyes reaching from top to bottom of the head, closely contiguous in both sexes; facets very small, of uniform size; vertex reduced almost to a point; three ocelli; frons and face forming an isosceles triangle, slightly prominent at base of antennæ, entirely bare; antennæ very long, 1st joint very long, cylindrical, 2nd less than half as long, cylindrical, 3rd joint flattened, style absent; proboscis very long and thin, porrect, the bifid tip curled backwards; palpi thin, short, concealed within or but slightly projecting from mouth-opening. *Thorax* a little longer than broad, with rounded corners, dorsum slightly arched, lower part of metathorax enormously developed, the hind coxæ set at its lowest point; scutellum broad, very short. *Abdomen*, except the triangular basal part of 1st segment, very attenuated, about one-fourth as wide as and three or four times as long as thorax; 8-segmented, tip more or less clubbed; genitalia small. Anterior *legs* comparatively short and thin, hind legs long and thin, stretching considerably beyond tip of abdomen; the femora, tibiæ, and tarsi of about equal length; metatarsus as long as rest of tarsus; pulvilli small; legs bare, except for some moderate-sized bristles on hind tibiæ. *Wings* long and narrow, cuneiform at base; alulæ entirely absent; auxiliary and 1st longitudinal veins very long, closely approximated; præfurca very short; 3rd vein widely forked near tip of wing; two, rarely three, submarginal cells, and only three posterior cells; discal cell present, anterior cross-vein just beyond its middle; anal cell closed at some distance from margin of wing; anal vein long, straight, reaching wing-margin.

Range. Africa, Asia, North and South America.

Life-history. Westwood (Trans. Ent. Soc. 1876, p. 571) describes the cocoons of a moth and the pupa of an African species of *Systropus* (*S. crudelis*, Westw.), found on a accacia-tree in Natal. The cocoon is oval, slightly flattened on the side attached to the tree, seven lines long, the outer surface smooth, and at one end is a circular piece which is easily removed, allowing the perfect insect to escape. The cocoons were probably of an "Egger" moth,* and inside each was a well-formed *Systropus* pupa possessing a strong frontal projection (apparently for the purpose of forcing off the lid of the cocoon). The head bears a long appendage below (probably the antennæ and proboscis). The abdomen is robust, convex, bearing a transverse row of spines on each segment, which doubtless also assists its escape from the cocoon. In one of the specimens the imago was seen in the act of escaping from its pupa skin, and Westwood notes that the mouth-parts during emergence consisted of four delicate lancet-like pieces. These doubtless united subsequently to form the proboscis. Westwood (Plate x) gives several figures of the pupa and perfect insect.

* [More probably a Limacodid of the genus *Parasa*.—Ed.]

Table of Species.

Hypopleura black, with distinct grey pubescence.
- Frons distinctly wider below than above; a yellowish spot on posterior calli .. *ophioneus*, Westw., [p. 291.
- Frons with nearly parallel sides; no pale spot on posterior calli ... *edwardsi*, sp.n., p. 294.

Hypopleura practically bare, yellow on anterior half, black posteriorly.
- Thorax mainly yellow, with a heart-shaped median black spot with short anterior stripe, two spots toward humeri, and a cuneate one at base of wing; occiput yellow; hind tibiæ yellow, a brown stripe on outer side and subapical blackish ring; halteres yellow .. *eumenoides*, Walk., [p. 294.
- Thorax mainly black, with yellow marks; occiput black, a little grey-dusted; hind tibiæ black, base narrowly brownish yellow, tips broadly yellow; halteres with club black, narrowly yellow-bordered *flavipleura*, sp. n., [p. 295.

229. Systropus ophioneus, *Westw.*

Systropus ophioneus, Westwood, Trans. Ent. Soc. v, p. 233, pl. xxiii, fig. 6 (1849); id., *op. cit.* p. 574 (1876).
Systropus migricaudus, Brunetti, Rec. Ind. Mus. ii, p. 483 (1909).

♂ ♀ *Head* with vertex reduced almost to a point; eyes black, bare, contiguous for rather more than half the distance from the

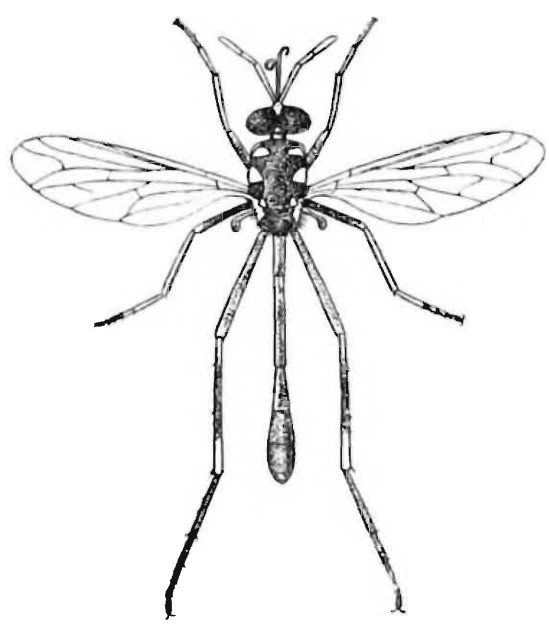

Fig. 21.—*Systropus ophioneus*, Westw.

vertex to the antennæ, gradually diverging until at the mouth-border they occupy nearly one-third the width of the head;

facets small, of uniform size; the frons and face combined appear as an isosceles triangle, the inner portion being very deeply retracted, leaving a broad white margin on the three sides; above this the antennæ are placed on a slight yellowish-white (almost quite white) prominence, and from the cavity below protrudes the long black proboscis, $3\frac{1}{2}$ mm. long, which is brown at the base below. Antennæ with first joint white at the extreme base, becoming immediately pale yellow, graduating into orange, which forms the centre part, and deepening into black for about the apical third; the whole joint with scattered short black spines; second joint half the length of the first, wholly black, closely covered with black spines; third joint all black, quite bare, slightly shorter than the first. Back of head silvery white, with some short white hairs. *Thorax* black, finely punctate, with very sparsely scattered, very short, golden-yellow hairs; two rather narrow central grey stripes run close together from the anterior margin to the middle, where they coalesce and continue united to the posterior margin; these stripes are only visible when viewed from behind. On the shoulders are placed three calli, the upper and largest one being almost bisected, the intermediate one very small and triangular, the lower one as large as the upper and also triangular; the upper one is contiguous to a more or less oblong spot on the dorsum, directed inwards and backwards; the remaining calli are placed vertically beneath the upper one, all being contiguous to one another, the lower ones touching the concolorous fore coxæ; all these spots are pale yellowish white. A scale-like callus is placed in front of the wing, and is yellowish white on the anterior half, and black on the remainder, which reaches back to the posterior callus which is yellowish white. Below this callus is a small round yellowish-white scale; by the side of the scutellum and below the wing is an orange-yellow scale-like process, connected by a thin membrane to the just-mentioned scale. The sides of the thorax are black, with a few blackish-brown hairs and some whitish-grey hairs in front of the insertion of the wings and a larger quantity of longer similar hairs on the large sternopleura. Scutellum black, finely punctate, posterior half with some grey hairs. *Abdomen* at base wider than the scutellum, rapidly contracting posteriorly, forming a triangle; black, finely punctate on dorsum, with some very short grey hairs; at the sides are much longer hairs, both black and grey; second to fifth segments (inclusive) very narrow, dorsum black, sides and venter orange-yellow, fifth slightly widening at tip; sixth, seventh, and eighth segments widened into an elongated club, but the segments themselves are all shorter than the others, the eighth being shortest of all; sixth segment orange, seventh and eighth reddish brown. The whole abdomen at sides with very short, scattered, golden-yellow hairs; on dorsum with microscopic black hairs, and the last three segments with very short black hairs, which are also present on the posterior borders of these latter. The anal appendage (♂) withdrawn within the

ninth segment (which latter is peculiar to the ♂ only, in accordance with Osten-Sacken's views in the Biol. Cent.-Amer., Dipt. i, p. 157), consists of an orange process bearing an upper pair of jet-black conical claspers, there being also an orange-coloured plate projected from the eighth segment, bearing a very small pair of black conical claspers at the tip. *Legs.* Coxæ: fore pair wholly pale yellowish white, bare; middle pair yellowish white, with a large black mark on the outer side, on the basal half, and bearing a few dark hairs; hind pair black, with a little pale colour on inner side below. Femora: fore pair pale yellowish white, with a dark brown streak behind, about the middle; middle pair black, extreme base and tip pale yellowish white; hind pair with basal half pale yellow, deepening to orange on the apical half, extreme base black above. Tibiæ: fore pair pale yellowish white, bare; middle pair similar, but with a few very black spines at the tip; hind pair yellowish orange, streaked here and there with black above, with irregularly-placed black spines, and with a circlet of some short black spines at the tip. Tarsi: anterior ones pale yellow, upper side blackish on apical half; hind pair black, minutely pubescent, slightly yellowish at extreme base, and with a row of minute black spines below. *Wings* light brownish grey, unmarked; halteres lemon-yellow.

Length, 17–23 mm.

I described this species as *nigricaudus* from a ♂ and ♀ in the Indian Museum from Soondrijal, Nepal, and Mussoorie respectively, and a second ♀ in the Pusa collection also from Mussoorie. Further specimens from Kalimpong, Darjiling Distr., 600–4500 ft., 24. iv.–10. v. 1915 (*Gravely*); Peshoke Spur, Darjiling Distr. (*Lister*); Mussoorie, ix. 1906; Shillong, 4900 ft., 27. vi. 1918.

After the careful examination of several specimens there seems no doubt that my *nigricaudus* is identical with *ophioneus*, which appears to show considerable variation in the extent of yellow in the antennæ, the size and extent of the thoracic spots and their frequent union by short connecting-bands, and in the presence or absence of the streak on the middle tibiæ, besides minor differences.

In the type of *nigricaudus* (Nepal) the 1st antennal joint and basal half of 2nd is yellow; the thoracic spots, three on each side of the dorsum, quite separate, the humeral one reaching down to the front coxæ; the scutellum is wholly black; the 1st abdominal segment also all black; the four anterior femora have more than the basal half black; the fascia on the middle tibiæ is not obvious, but the inner side from base to tip bears minute black bristles. In another specimen (Darjiling) the first two antennal joints are yellow; the spots on the humeral, prealar, and posterior calli are joined by a distinct yellow band, the anterior spot extending broadly to the fore coxæ; the scutellum is all black, except for a distinct yellow hind margin; the first abdominal segment all black; the fascia on the middle tibiæ absent. In a third specimen (Kalimpong, Darjiling District) the antennæ are black, except the

major portion from the base of the 1st joint; the two anterior pairs of thoracic spots are broadly joined, the humeral pair extending downwards to the front coxæ; the cuneate hinder spots are isolated; the scutellum black, but the underside of the hind margin is yellow; nearly the whole of the club of the halteres is black, leaving a narrow yellow margin; the inner side of the middle tibiæ is distinctly brownish, with tiny black bristles.

230. **Systropus edwardsi**, sp. nov.

♂ Near, but quite distinct from, *ophioneus*. Antennæ black, except 1st joint which is brownish basally; *face with nearly parallel sides*. Dorsal spots on thorax as follows:—A humeral nearly square one, with a piece cut out of the front side; this spot connected by two small ones with the yellow propleura as in *ophioneus*, also extended along dorsal margin, narrowing to a point, turning upwards and nearly reaching wing-base; all these spots bright yellow; no spot on posterior corners of dorsum, but the margin in that neighbourhood showing yellowish traces; a little yellowish about wing-base and contiguous to 1st abdominal segment, but the pleura practically all black. Sides of abdomen orange or brownish yellow to the tip, including last segment and genitalia. Anterior legs pale yellow, showing darker traces on upper side of femora.

In all else as in *ophioneus*.

Length, 22 mm.

Described from a unique ♂ in the British Museum from Taung-ngu, Burma, xi. 1889 (*Lt.-Col. C. T. Bingham*).

231. **Systropus eumenoides**, *Westw.*

Systropus eumenoides, Westwood, in Guérin's Mag. Zool. p. 4, pl. 90 (1842); id., Trans. Ent. Soc, pl. x, figs. 13, 14, 15 (1876).

"Antennæ yellow, 1st joint at tip, and 2nd and 3rd joints black; face and back of head yellow. Thorax yellow, a median short stripe in front, a large heart-shaped spot in centre of disc, two small spots near humeri, and two wedge-shaped others at base of wing, black.

"Yellow, black-marked. Abdomen with 1st segment black above, the four next yellow, with a narrow median interrupted brown stripe; two last segments black, with yellow hind margins; halteres yellow. Wings pale yellow, costa hardly darkened; veins just behind the costa yellow, the others brown. Four anterior legs yellow, tarsi black above at tip; hind femora brownish yellow, hind tibiæ yellow, a brown short stripe on outer side, and a blackish subapical ring; tarsi with a short brown stripe above." (*Westwood.*)

Length, 18 mm.

North part of India.

Type in the British Museum.

232. **Systropus flavipleura**, sp. nov.

♂ ♀ Differing from *ophioneus* in having the antennæ all black, except the 1st joint which is indistinctly pale at base. Thoracic markings as follows:—Dorsum black; a diagonally-placed humeral spot, its inner end bluntly pointed; two small contiguous spots immediately below its anterior end and touching the all-yellow propleura; an isosceles triangular spot on posterior corner of dorsum connected by a narrow yellow line with a good-sized spot just before wing-base. Front side of sternopleura bright yellow, the colour continuing up to the 1st abdominal segment; hinder side of lower part of thorax yellow, with a median black stripe. Sides of first four abdominal segments bright golden yellow, remainder of abdomen dark brown.

Length, 22–28 mm.

Described from two specimens in the British Museum.

The type ♂ from the Lower Ranges, N. Khasi Hills, Assam, 1878 (*A. Chennell*). The second specimen is a ♀ and bears no data. The Indian Museum possesses one specimen from Sikkim.

Family THEREVIDÆ.

Head about as wide as thorax, nearly semicircular, neck short, occiput slightly puffed out. Eyes bare, contiguous or subcontiguous in ♂, wide apart in ♀; frons generally more or less produced about base of antennæ, and, with the face, bare or pubescent; three ocelli. Proboscis rather prominent, of moderate size, rather thick, upturned; labella broad; palpi unjointed. Antennæ often showing excessive or even monstrous development, approximate at base, 3-jointed,* with usually an apical style; sometimes slender and of considerable length (*Phycus*); sometimes the 1st joint enormously developed, longer than the head.† The only head-bristles are postocular, and some at the extreme back of the head.

Thorax subquadrate or slightly longer than broad, slightly arched, generally with dense pubescence, which is normally longer and thicker in the ♂ The macrochætæ are: 2 to 6 presutural, 1 or 2 supra-alar, 1 strong postalar, 1 or 2 pairs prescutellar, other dorso-central bristles generally absent. Scutellum distinct, semicircular, with four (rarely two) strong bristles on hind margin.

Abdomen of seven segments (rarely more); generally elongate-conical and in most species with dense pubescence, which is more erect in the ♂ than in the ♀; no macrochætæ. Genitalia in ♂

* Some authors (as Mik) have claimed four joints in *Thereva*, Lundbeck even admitting five, but this is incorrect. The 3rd joint sometimes has a basal annulation, which has the appearance of a joint, and the style has sometimes the appearance of being divided.

† *Xestomyza* and others; no genus of this kind is Oriental.

moderately large; in ♀ long, shining, with a circlet of spines at tip as in many ANTHRACINÆ and ASILIDÆ.

Legs rather long and thin, with bristles of moderate size; anterior tibiæ with two or three longitudinal rows of bristles, hind tibiæ with four rows; all tibiæ with a circlet of apical spines; pulvilli two or none, empodium reduced to a thin bristle or absent.

Wings with a rather uniform venation; 1st and auxiliary veins not extending much beyond middle of wing; præfurca beginning at some distance before base of discal cell; 2nd vein simple; 3rd forked, the fork generally including the wing-tip; upper branch of 4th vein forked; 5th vein forked; anal vein present and generally axillary vein also; anterior cross-vein placed at about middle of discal cell, which latter is always present; posterior cross-vein present. Two submarginal, five posterior cells, 4th sometimes closed. "Squamæ with only the alar pair developed, but they are rather large and peculiarly folded, so that the strongly-defined margin is angled about the middle, and gives the impression of there being two pairs of squamæ." (*Verrall.*)

Life-history not definitely known, although on several occasions specimens have been alleged to have been bred from Lepidopterous larvæ (*Sphinx*, *Triphœna*, *Aleucis*). Larvæ very elongate, cylindrical, very active, vermiform, with exserted head; body apparently of 19 or 20 segments, probably caused by subdivision of true segments, amphipneustic, with prothoracic spiracles on 2nd body-segment, and a posterior pair at sides of 4th segment from tip; last segment small; no pseudopods, but a few fine bristles on first three body-segments. Pupa free, bearing antennal sheaths on front side of head. The larvæ are found in the earth or in sand, sometimes in decaying wood, occasionally in fungi, turnips, or dung; they are said to be carnivorous. The perfect insects occur chiefly in shady places, on bushes and low-growing plants, Walker and Williston stating that they prey on other insects, although no sufficiently attested case of the kind is known; and they are also stated to be cannibalistic in captivity. Beling and Bouché have supplied most of our knowledge on this subject.

The THEREVIDÆ occur in all parts of the world, but are most numerous in Europe and North America. They are easily recognised by their usually furry appearance, subconical shape, and unmarked wings, and can be distinguished from their nearest allies, the BOMBYLIIDÆ, by the five posterior cells and the presence of the posterior cross-vein. Many species are objects of great beauty; amongst Indian representatives of the family may be noted *Psilocephala sequa*, Walk., which is covered with nearly snow-white pubescence and performs aerial dances in many places. Although the Indian species (except one or two *Psilocephala*) appear quite distinct, the family is noted for the exceedingly close affinity of some species, characters which at first sight would appear trivial being constant and of quite good specific value.

Table of Genera.

First antennal joint nearly as long as head ..	PHYCUS, Walk., p. 306.
First antennal joint much shorter than head.	
Face and frons with long dense pubescence	THEREVA, Latr., p. 297.
Face bare; frons bare, or with comparatively short pubescence in ♂	PSILOCEPHALA, Zett., [p. 302.

Genus **THEREVA**, *Latr.*

Thereva, Latreille, Précis Car. Gen. Ins. p. 167 (1796); id., Hist. Nat. Crust. Ins. iii, p. 441 (1802).

GENOTYPE, *Musca plebeja*, L. (Europe).

Head semicircular, placed closely on thorax; frons slightly produced towards antennæ, densely pubescent in ♂, shortly so in ♀, a transverse shining black callus present in ♀; face sloping, covered thickly (as is all the lower part of the head) in ♂ with dense pubescence, in ♀ pubescence much shorter; three ocelli. Proboscis of moderate length, rather upturned, labella large; palpi cylindrical, thin, pubescent. Eyes bare, contiguous in ♂ for some distance, wide apart in ♀ Antennæ porrect, approximate at base, rather long; 1st two joints cylindrical, bristly and pubescent; the 2nd short; 3rd narrowed at base, elongate-conical, sometimes indistinctly annulated near base, bare, bearing a short style ending in a minute filament. *Thorax* oval, densely pubescent in ♂, less so in ♀ Three to six presutural, two supra-alar, one postalar, and one or two pairs of prescutellar bristles, all strong and black, but the latter ones liable to variation. Scutellum semicircular, with four marginal bristles; metanotum small, bare. *Abdomen* conical, longer than thorax, with seven or eight segments in ♂, the 8th always distinct in ♀, forming basal portion of ovipositor; pubescence dense and furry in ♂, shorter in ♀, and usually adpressed on basal segments. Genitalia not prominent, but often visible; ovipositor with a circlet of strong black spines. *Legs* moderately long, slender; some black bristles on coxæ and anterior femora; tibiæ with rows of small bristles and a circlet of spines at tip. *Wings* with normal Therevid venation; 4th posterior cell generally closed or narrowly open.

Range. World-wide, but apparently better represented in Europe and North America.

Life-history. Partly known; larvæ very active, occurring in damp earth, under stones, and in similar places; possibly they feed, at least occasionally, on Lepidopterous larvæ.

Only four species are known for certain from India; these may be separated as follows:—

Antennæ mainly bright brownish yellow.	*kempi*, sp. n., p. 298.
Antennæ wholly black.	
Legs all blackish.	*nigella*, Wied., p. 299.

Tibiæ brownish yellow.
Posterior margins of abdominal segments narrowly and uniformly yellow .. .. *flavolineata*, Brun., p. 299.
Posterior margins of abdominal segments ash-grey, much broader towards sides *bilineata*, Brun., p. 300.

Four other species are probably from India, but require confirmation.

233. **Thereva kempi**, sp. nov.

♂ *Head* with eyes contiguous for about one-third of the distance from vertex to antennæ, with a dull greenish tinge; vertex yellow-dusted, with a few black hairs; ocelli shining black; frons yellow-dusted, rather closely punctured, with long black bristly hairs on upper part, continuing down the sides as far as level of antennæ; rest of frons and whole of face and cheeks covered with dense bright chrome-yellow bristly hairs. Antennæ orange; upper part of 3rd joint, except at base, blackish, as is also the style; 1st joint with conspicuous long black bristles; 2nd with an incomplete circular band of smaller black spines; 3rd with a little whitish pubescence and a few small bristles at base above. Proboscis orange; occiput yellowish, on upper half with short yellow pubescence and a row of strong black bristles along upper margin; lower part behind eyes whitish, with long black hairs. *Thorax* black, covered with rather dull yellow tomentum and, at least towards sides of dorsum, with short bright yellow somewhat coarse pubescence; the whole dorsum covered with long fine black hairs, which are densest in the centre. Scutellum yellow-dusted, darker in centre and at base, with yellow pubescence with a considerable number of long black hairs intermixed; hind margin with four long bristles. Pleuræ light grey, closely covered with bright yellow pubescence, which is mainly replaced on the sternopleura by white hairs. *Abdomen* with 1st segment dark grey, with sparse soft black hairs; rest of segments deep black, more or less shining at base, with a well-marked bright golden-yellow hind margin to each, the colour extending forwards towards the sides as far as the middle of each segment or beyond; whole dorsum covered with dense black or yellow pubescence according to the ground-colour. Venter light grey, appearing darker in certain lights, with distinct pale yellowish-white hind margins to segments; the whole surface with sparse soft bright yellow hairs. *Legs*: coxæ light grey, with rather long yellow pubescence; femora black, anterior pairs with similar pubescence; hind pair nearly bare, but with a row of seven or eight black bristles below; tibiæ brownish yellow, blackish at tips, with the usual bristles and microscopic pubescence; tarsi dirty brownish yellow, tip of 1st joint, apical third of 2nd, base of 3rd and 4th narrowly, and all 5th black. *Wings* pale grey, highly iridescent; 4th posterior cell closed slightly before the border; stigma dark brown; halteres blackish.

Length, 12 mm.

Described from a perfect unique ♂ in the Indian Museum from Shillong, Assam, 5500 to 6400 ft., 29. viii–5. ix. 1915 (*Kemp*).

A very beautiful species, unlike any other Indian form; it must bear considerable resemblance to *T. fulva*, Mg., of Europe.

234. Thereva nigella, *Wied.*

Thereva nigella, Wiedemann, Auss. Zweifl. i, p. 232 (1828).

♀ "Antennæ blackish, in certain lights whitish. Epistome, beard, and moustache white; frons and back of head with a white shimmer. The rather rubbed thorax shows faint traces of stripes; the side margins broadly whitish. Abdomen with some white hairs on the side margins, the segments hardly whitish. Wings quite clear; halteres brown, with white knobs. Legs blackish, with short white hairs. Type in Westermann's collection. Tranquebar. Length $4\frac{1}{3}$ lines." (*Wiedemann.*)

235. Thereva flavolineata, *Brun.*

Thereva flavolineata, Brunetti, Rec. Ind. Mus. vii, p. 480 (1912).

Head: frons small, black, with black hairs; ocelli red; eye-facets larger in front; face grey, with long stiff black hairs above the antennæ and with long greyish hairs below them; antennæ black, microscopically grey-dusted; oral orifice reddish yellow; back of head dead grey, with greyish hairs; vertex and upper border of eyes with black hairs. *Thorax* dark brown, with two well-separated, moderately wide, chrome-yellow stripes; dorsum covered with mixed brown and yellow hairs, the former mainly on the darker parts; sides of thorax blackish grey in front of wings, ashy grey on lower part, with shaggy dirty white hairs in front of and below shoulders, and in front of wing-base; some yellow hairs above insertion of wings. A row of three bristles between the humerus and transverse suture, two supra-alar bristles (others possibly broken off). Scutellum yellowish, with a brownish basal triangle, dorsum with brown and grey hairs; two preapical well-separated bristles. *Abdomen* blackish grey, posterior margins of segments very narrowly yellow, but more widely so on 3rd and 4th: 1st segment wholly, 2nd, 3rd, and 4th wholly (except posteriorly at the sides), 5th at base, black; dorsum of abdomen with black hairs, which are thickest and longest on the black parts; sides with moderately long whitish-yellow hairs; posterior margins of segments with very short, similarly coloured hairs. Venter bluish grey, posterior margins of segments more broadly yellow, especially on 3rd and 4th segments; the whole surface with soft white hairs. Genitalia distinct, shining brown, with brownish hairs on upper, and whitish hairs on lower parts. *Legs* (hind pair wanting): coxæ and femora blackish grey, the former with long greyish-white hairs in front; the latter with grey hairs below on proximal half, blacker hairs on discal half; tibiæ reddish yellow,

blackish at tip, microscopically pubescent, with numerous rather short spines; tarsi darker. *Wings* nearly clear, veins brownish yellow; tegulæ dirty white; halteres brown and yellow.

Described from a ♂ in the Indian Museum from Shillong.

A second specimen, also from Shillong, 4900 ft., 10–12. x. 1914 (*Kemp*), is identical, except that the abdominal segments have no pale sides, as in the type, but the hind borders of the 2nd segment and onwards are very narrowly yellowish towards each side, and bear thereon some rather long yellowish hairs.

236. **Thereva bilineata,** *Brun.*

Thereva bilineata, Brunetti, Rec. Ind. Mus. xiii, p. 78 (1917).

♀ *Head* with frons at vertex distinctly more than one-third width of head, at level of antennæ over half the head; its upper two-thirds yellowish brown, the rest (with face) ash-grey; whole frons with scattered black hairs of moderate length; face wholly covered with long pendent whitish-grey hairs, extending over cheeks and lower part of occiput; some black hairs below or around mouth; proboscis reddish brown; antennæ black, first two joints with strong black bristles, 3rd as long as 1st; vertical triangle barely raised; a row of rather strong bristles along upper occipital margin, a second row a short distance behind the first. *Thorax* dark brown, nearly black, with two distinct, yellowish-white, well-separated dorsal stripes from anterior to hind margin and minute sparse yellowish pubescence. A row of five powerful spines behind humerus, extending towards wing-base; two supra-alar (postsutural), one post-alar, a large and lesser one on each side margin of scutellum and a pair of apical scutellar decussate nearly perpendicular ones. Pleuræ ash-grey, with long whitish-grey pubescence. Scutellum ash-grey, with a large brown spot at base; hind margin with soft yellow hairs as well as the bristles. *Abdomen* black; 1st segment grey, with yellow pubescence on hind margin and whitish hairs at sides; rest of segments with distinct ash-grey hind borders, which are narrowest in middle, bearing some yellow or yellowish-white pubescence; sides of 2nd and 3rd segments with whitish hairs; rest of dorsum and at sides with short black pubescence; 7th segment shining chestnut-brown; genitalia the same, marked with yellow, fairly prominent; venter black, all segments except 1st with well-defined bare hind margins. *Legs*: femora black, with depressed white pubescence and a short row of bristles in middle of underside; tibiæ brownish yellow, darker at tips; fore tibiæ with three (inner pair wanting), posterior pairs with four rows of strong spines; tarsi brownish, yellow or dark brown, joints paler at base, shortly pubescent. *Wings* pale grey, normal; halteres black.

Length, 11½ mm.

Described from a unique ♀ in the Indian Museum from Theog, Simla Distr., 8000 ft., 1. v. 1907 (*Annandale*).

This species bears some resemblance to my *flavolineata*.

237. Thereva cylindrica, *Walk.*

Thereva cylindrica, Walker, List Dipt. Brit.Mus. i, p. 224 (1848).

♂ "Body long and narrow; head white, hoary behind, with a few black bristles along the hind borders of the eyes, clothed beneath with white hairs; eyes green and red; feelers black; 1st joint clothed with black hairs; 2nd joint and base of the 3rd tawny; mouth piceous; chest hoary, clothed with hoary down, and with a few black bristles on each side, where there is a white stripe, and it has also a broad yellowish-brown stripe in the middle; breast white and clothed with white hairs; abdomen brown, covered with silvery glance, yellowish brown towards the tip, where it is clothed with dark tawny hairs; hind borders of the segments pale tawny and adorned with fringes of white hairs; legs grey; hips white; wings slightly grey, tawny along the fore border; brands brown and narrow; veins piceous, slightly bordered with dark tawny; poisers piceous, with dark tawny knobs.

"Length of the body 5 lines, of the wings 8 lines. East Indies." (*Walker.*)

Though described from the "East Indies," the type in the British Museum bears the simple label "Ind.", which is considered to signify India proper.

238. **Thereva indica,** *Walk.*

Thereva indica, Walker, Ins. Saund., Dipt. pt. 3, p. 159 (1852).

♀ "Body black; head shining above, tinged with grey and clothed with hoary hairs beneath; sucker and feelers black; breast tinged with grey; abdomen spindle-shaped, very much longer than the chest; hind borders of the segments and underside tinged with grey; legs tawny, beset with a few black bristles; claws black; wings grey; brands brown; wing-ribs pitchy; veins black, pitchy at the base; poisers pitchy.

"Length of the body 5 lines; of the wings 9 lines. East India." (*Walker.*)

239. **Thereva persequa,** *Walk.*

Thereva persequa, Walker, Ins. Saund., Dipt. pt. 3, p. 158 (1852).

♀ "Body black, head very shining above, silvery white in front and beneath, where it is clothed with white hairs; sucker black; palpi tinged with grey, thickly clothed with white hairs; chest grey, dull, adorned on each side with a pair of hoary stripes, a pitchy tinge between each pair; sides and scutcheon armed with black bristles; breast hoary, clothed with white hairs; abdomen black, shining, clothed with very short black hairs, slightly decreasing in breadth from the base to the tip, near twice the length of the chest; hind borders of the 1st and 2nd segments fringed with short white hairs; tip armed with a circlet of black spines; legs ferruginous; hips black, tinged with hoary, clothed with white hairs; shanks beset with black bristles; feet black, pitchy at the base; foot-cushions pitchy; wings grey, slightly

tinged with brown along the borders of the veins; poisers tawny, their knobs black, with a hoary tinge.

"Length of the body 3¼ lines, of the wings 5 lines. East India." (*Walker.*)

240. **Thereva invaria,** *Walk.*

Thereva invaria, Walker, Ins. Saund., Dipt. pt. 3, p. 159 (1852).

♀ "Body black, clothed with black hairs; head clothed beneath with white hairs; sucker pitchy, clothed with tawny hairs; breast and underside of abdomen grey, the former partly clothed with whitish hairs; abdomen spindle-shaped, very much longer than the chest; hind borders of the segments lurid; a large tuft of white hairs on each side of the base; legs black, clothed with short black hairs, beset with a few black bristles; foot-cushions pitchy; wings slightly grey; wing-ribs pitchy; veins black, strongly marked, pitchy towards the base; brands brown; poisers pitchy.

"Length of the body 5 lines, of the wings 9 lines. East India." (*Walker.*)

Genus **PSILOCEPHALA,** *Zett.*

Psilocephala, Zetterstedt, Ins. Lapp. p. 525, note (1838); id., Dipt. Scand. i, p. 19 (1838) (*Psilocehala,* lapsus).

GENOTYPE, *Bibio imberbis,* Fln. (Sweden); by Coquillett's designation (1910).*

This genus differs from *Thereva* in the bare face; and from a nearly allied European genus, *Dialineura,* which may probably occur in India, it is known by the 1st antennal joint being no broader than the 2nd and not more bristly than usual. The alleged character that the 1st joint is shorter than the 2nd and 3rd combined, as compared with its being longer than the 2nd and 3rd together in *Dialineura,* seems an uncertain one.

The species are by no means almost bare, as stated by Verrall.

Range. Europe, Asia, North, Central, and South America, North and South Africa, Madagascar, Sokotra.

Life-history. Probably similar to that of *Thereva.*

Five species are definitely known from India or Ceylon, with one additional species, *sequens,* Walk., requiring confirmation. These five are difficult to tabulate, from the general similarity of the descriptions, although when placed side by side the species may appear quite distinct. The colour of the legs, though apparently an unreliable character, is perhaps as constant a one as any, but the present table is, at best, only a preliminary one.†

* It would have been better to have selected the well-known European *ardea,* F., as genotype.

† It is advisable in this family to compile a separate table for each sex, but the females are known of only three out of the five species.

Table of Species.

1. Femora dark brown; all tibiæ and tarsi pale yellowish brown; (thorax presumably unstriped)	*albina*, Wied., p. 303.
Femora black or blackish, with or without white or silvery shimmer ..	2.
2. Front tibiæ blackish brown, or at least distinctly darker than posterior pairs.	3.
All tibiæ (presumably) uniformly pale, at most tips darker ...	*sequa*, Walk., p. 305. *affinis*, Kröb.,* p. 306.
3. Thorax dull black, with two grey stripes; emarginations of abdominal segments reddish or yellowish.. .	*indica*, Big., p. 304.
Thorax dark grey, one median darker stripe; abdominal emarginations not coloured; eyes absolutely contiguous.	*ceylonica*, Kröb., p. 304.

241. **Psilocephala albina**, *Wied.*

Thereva albina, Wiedemann, Zool. Mag. i, pt. 3, p. 3 (1819); id., Auss. Zweifl. i, p. 233 (1828).
Psilocephala albina, Kröber, Ent. Mitteil. Berl. i, p. 252 (1912).

♂ "*Head* with silvery-white tomentum, extreme margins of frontal triangle appearing dark brown; in certain lights can be seen two dark parallel stripes, fading away downwards towards the antennæ; antennæ blackish brown, sparsely beset with black bristles; palpi and proboscis long, with snow-white hairs; back of head with whitish-grey tomentum and white hairs; orbital bristles black. *Thorax* dull grey, with yellow and grey pubescence; scutellum like thorax, with black bristles; sides of thorax blackish, grey-dusted and with grey hairs. *Abdomen* black, dull, with somewhat strong silvery glistening and long whitish hairs, which in certain lights, especially on the last segment, appear yellow; 2nd to 4th segments with yellowish hind margins. Venter blackish, with grey pubescence, with yellowish hind margins to segments; genital lamellæ reddish yellow, with black and whitish-yellow hairs. *Legs*: coxæ blackish, white-haired; femora dark brown, covered with white pubescence; tibiæ and tarsi pale yellowish brown, tips darkened. *Wings* hyaline, veins weak, yellowish, 4th posterior cell closed; halteres blackish brown, tips of clubs whitish. Length, 9 mm. Type ♂ from Java, in the Vienna Museum.

♀. "Frons narrow, dull blackish brown; epistome shining silvery white; two dull black spots near each other above the antennæ, outlined with white; antennæ and back of head as in ♂ Thorax and scutellum black, with very sparse yellowish and grey hairs; sides of thorax blackish, with silvery-white tomentum and white hairs. Abdomen dull blackish brown; each segment bears an ill-defined triangular silver-white spot on each side on the hind

* These two species are almost certain to be identical. No characters of differential value can be selected from Kröber's description of his unique type.

border, not meeting on the disc; according to the light the abdomen above appears deep black or dark brown; 2nd segment with a distinct silky-white margin. Ground-colour of venter black, with a silvery sheen; the 1st segment white-haired on each side; the last one short, with black raised hairs. Femora blackish brown, with silvery-white hairs: tibiæ and tarsi pale yellowish brown, front tarsi darkened. Wings as in ♂; 4th posterior cell closed. Length, 10 mm. Type ♀ from East India, in Vienna Museum." (*Kröber.*)

This species is introduced to the British Indian fauna on the strength of the ♀ recorded by Kröber from East India.

242. **Psilocephala indica**, Big.

Psilocephala indica, Bigot, Ann. Soc. Ent. France, (6) ix, p. 326 (1889).

♂ "Antennæ blackish, the two first segments furnished with some black hairs; proboscis and palpi blackish, these latter with white hair; face black, covered with whitish tomentum; beard white; thorax dull black, as well as scutellum, two grey stripes on dorsum, sides of dorsum and sides of thorax with white tomentum; halteres brown, pale at tips; abdomen dull black, with venter and sides with white tomentum, the emarginations of the segments reddish; femora black, tibiæ pale tawny with black tips; tarsi brown, metatarsi pale tawny at base; wings hyaline.

♀ "Resembling the male; frons black, whitish below, abdominal segmentations paler.

"India. Three ♂♂, two ♀♀ Length, 10 mm." (*Bigot.*)

243. **Psilocephala ceylonica**, *Kröb.*

Psilocephala ceylonica, Kröber, Ent. Mitteil. Berl. i, p. 251 (1912).

♂ "With sparse snow-white hairs throughout. Eyes absolutely contiguous, rather large, shining green; epistome and frons snow-white, with silvery shimmer; extreme margins of frontal triangle velvet-black; 1st antennal joint black, 2nd and 3rd dark reddish brown, style black, bristles black. Thorax dull dark grey, with a blackish-brown median stripe, which is narrowly bordered with whitish grey; the short erect hairs are blackish, bristles black; scutellum dark grey, blackish brown in centre; sides of thorax silver-grey. Abdominal ground-colour deep velvet-black, appearing wholly black or glistening silvery white according to the direction of the light; posterior margins of segments indistinctly whitish; genitalia small, reddish; venter like dorsum, borders of segments distinct. Femora black, with silvery-white pubescence; tibiæ and tarsi brownish yellow, front tibiæ and tarsi blackish brown, tips of posterior pairs darker. Wings with a brown tinge, rather deeply yellowish brown on anterior margin; veins very strong, slightly infuscated; 4th posterior cell closed in one wing and open in the other; halteres blackish brown, clubs paler. Length, 12 mm. Colombo. Type in Hungarian Museum." (*Kröber.*)

244. Psilocephala sequa, *Walk.* (Pl. III, figs. 17–20.)

Thereva sequa, Walker, Ins. Saund., Dipt. pt. 1, p. 157 (1852).

♂ ♀ *Head* in ♂ with eyes contiguous for about half the distance from frons to vertex, leaving an elongate light yellowish-grey vertex bearing a few brown hairs, with the front ocellus at some distance from the other two; ocelli red; frons at level of antennæ nearly one-third of the head, and with face wholly covered with snow-white tomentum, with here and there a little short concolorous soft pubescence; upper corner of frons with a few black stiff hairs. Proboscis short, thick, dark brown, extending as far as tip of 1st antennal joint, with moderately long soft white hairs. Antennal 1st joint blackish, white-dusted, with numerous strong black bristles; 2nd and 3rd joints dull red-brown, with a little greyish dust; 2nd nearly cylindrical, with a few short bristles; 3rd elongate, bare. Occiput projecting only slightly behind eyes, covered with hoary tomentum, a little white pubescence, and some strong black bristles. In ♀, frons at vertex broader than in ♂, widening rapidly to level of antennæ, where it is one-third the width of the head; eye-margins slightly emarginate towards antennæ; the yellowish-grey colour of the vertex extending halfway to antennæ and on its lower margin overlapping the snow-white frons, a large rounded or subtriangular black spot on each side touching the eyes; vertical margin with a row of about ten black bristles. *Thorax* wholly covered with pale bluish-grey tomentum; dorsum darker, with two narrow well-separated whitish stripes (the intermediate space often brown), running practically from anterior to posterior margins; dorsum covered with fine brownish pubescence of some length, and sparsely with short snow-white hairs; thicker and longer whitish-grey pubescence on the pleuræ and underside between the first two pairs of coxæ. Normal macrochætæ along sides of thorax, dorso-centrals represented by a single pair near hind margin; scutellum, which is clothed with hoary tomentum and soft whitish pubescence, bearing four bristles, a marginal and an apical pair. *Abdomen* in ♂ covered with silvery-white dust, which is most conspicuous seen from above, as, when viewed from behind at a low angle, it almost disappears, the abdomen seeming dusky; there being also some short snow-white hairs, and at the sides much longer fine white or nearly white pubescence, which has a tendency to form a fan-shaped bunch on each segment, especially on the first three; venter blackish, nearly bare; hind margins of 2nd, 3rd, and 4th segments distinctly brownish yellow; tip of abdomen with a few bristles; genitalia reddish brown. In ♀, deep black, with microscopic depressed yellow hairs; 1st segment wholly grey-dusted; towards sides of each remaining segment a snow-white tomentose triangular spot with short snow-white pubescence; these spots being largest on 2nd and 3rd segments and smallest on 4th, on 5th and 6th segments they are merged in a general whitish-grey dusting; surface of abdomen with sparse long stiff black hairs from 4th

segment (on which they are most numerous) onwards, but they are very inconspicuous and easily overlooked; venter covered with snow-white tomentum and some short white pubescence, the bases of some of the apical segments being blackish. *Legs*: coxæ and femora clothed with snow-white pubescence; tibiæ (except tips) and about basal half of metatarsi brownish yellow; rest of legs black. *Wings* pale grey, vitreous, veins towards base yellowish; halteres pale yellowish.

Length, ♂ ♀, 9–11 mm.

Described from a long series, mostly males, in perfect condition from Pusa, Bengal, where it is apparently to be found from January to July inclusive, it having occurred in abundance on 13 and 14. iii. 1909, performing aerial dances between 8 and 9 A.M. In the British Museum from Mahagany and Tiriyai, Ceylon, taken in January, May, June, September, and November (*Col. Yerbury*); Castle Rock, 11–26 x 1916 (*Kemp*).

245. **Psilocephala affinis**, *Kröb.*

Psilocephala affinis, Kröber, Ent. Mitteil. Berl. i, p. 254 (1912).

"♂ Near *P. ardea*, F.,* and *P. ceylonica*, n. sp. The whole body covered with snow-white pubescence, except for some brown hairs intermixed on the thorax. The 1st and 2nd antennal joints black-haired; frons and epistome silvery white, extreme margin of frontal triangle deep velvet-black; antennæ deep black, thin; back of head grey, below nearly white, orbital bristles black. Thorax dark grey, with two whitish longitudinal stripes, between and beside which the colour appears almost brownish; scutellum like thorax; sides of thorax silvery grey. Abdomen very silvery, metallic; 2nd to 5th segments with snow-white edges; genital lamellæ reddish yellow; venter similar to upper side, ground-colour black, with hind margins of segments white and with silvery reflection. Femora and tarsi black; tibiæ and extreme base of metatarsi of middle and hind legs yellowish brown; extreme tips of tibiæ more or less blackish brown. Wings absolutely byaline; 4th posterior cell closed; halteres with stalk yellowish, knobs white with black base. Length 9–9½ mm. Type ♂ from Agra, in Vienna Museum." (*Kröber.*)

Although the expression metallic as applied to the abdomen seems suggestive of specific distinctness, this insect is almost certainly identical with *sequa*, Walk.

Genus **PHYCUS**, *Walk.*

Phycus, Walker, Ins. Saund., Dipt. pt. 1, p. 2 (1850).

GENOTYPE, *Xylophagus canescens*, Walk.; by original designation.

Head transverse, broader than thorax; proboscis short, thick, not extending beyond anterior margin of eyes; palpi shorter than

* A European species.

proboscis, thin; eyes separated in both sexes, bare; frons narrower in ♂, or eyes sometimes contiguous in ♂ Antennæ porrect, with 1st joint very long, cylindrical; 2nd quite short; 3rd long, longer or shorter than 1st, elongate leaf-shaped, narrow at base, pointed at tip, with distinct short style. *Thorax* oblong. *Abdomen* longer than thorax, cylindrical in ♂, rather compressed towards tip in ♀; genitalia obvious. *Legs* slender. *Wings* with venation as in *Thereva*.

The species are rather small, elongate, and nearly bare.

Range. S. Europe (one species), Asia, Australia, South America, with possibly a species from Africa.

Life-history unknown.

Only three species are Indian, no other Oriental ones being known.

Table of Species.

Third antennal joint distinctly shorter than 1st; all femora yellow (in var. *brunnipes* fore femora only pale).	
Eyes in both sexes distinctly separated; abdomen without silvery shimmer, but with yellowish-white bands to several segments	*brunneus*, Wied., p. 307.
Eyes in ♂ contiguous for some distance; abdomen (dorsum) wholly covered with brilliant silvery shimmer, transverse bands barely visible	*argentiventris*, sp. n., [p. 309.
Third antennal joint distinctly longer than 1st; all legs wholly black. .	*atripes*, Brun., p. 309.

246. **Phycus brunneus**, *Wied.* (Pl. III, figs. 21–23.)

Phycus brunneus, Wiedemann, Analec. Ent. p. 19 (1824); Brunetti, Rec. Ind. Mus. vii, p. 479 (1912).
Xylophagus brunneus, id., Auss. Zweifl. i, p. 85 (1828).
Xylophagus canescens, Walker, List Dipt. Brit. Mus. i, p. 129.
Phycus canescens, id., Ins. Saund., Dipt. pt. 1, p. 2, pl. i, fig. 5 (1850).

♂ ♀ *Head*: frons in ♂ less than half as wide at vertex as at level of antennæ, where it is between one-third and one-fourth the width of the head, slightly broader throughout in ♀; covered on upper half with almost microscopic silver-grey pubescence, lower part shining black, bare; the shining reddish distinct ocelli on a small obvious prominence; face broad, with parallel sides and silvery-white tomentum on upper part and also on each side of the antennal prominence; mouth-opening large, black; proboscis rather thick, extending forward about as far as base of antennæ; palpi as long as proboscis, thin, slightly clubbed at tip, black, pubescent. Antennæ normally black; 1st joint sometimes brownish red or dark brown or even brownish yellow, a little longer than head, with microscopic grey pubescence and some short bristly hairs along the underside, beset above with very short stiff hairs; 2nd joint very short, with black bristles; 3rd about

half as long as the 1st, flattened, dull blackish red, practically bare, elongate leaf-shaped, not quite straight nor yet with quite parallel sides, bearing a minute black apical style-like tip. *Thorax* shining black, with a broad whitish-grey median stripe from anterior to hind margin, often with a narrow whiter line along its middle; transverse suture well marked at each end; whole dorsum covered, though not thickly, with minute whitish-grey pubescence; humeri bare, shining; pleuræ and underside of thorax with greyish microscopic pubescence, with a few sparse longer hairs here and there. Scutellum reddish brown, base more or less black, sometimes wholly black, with two long black bristles on hind margin. *Abdomen* shining black, hind margins of 2nd, 3rd, and 4th segments narrowly brownish, yellowish, or even white, the colour always distinctly broader on 2nd segment; sometimes hind margin of 1st segment also faintly or distinctly pale; dorsum covered with minute, rather sparse, whitish pubescence, which is distinctly longer on the sides and venter, which latter is generally a replica of the upper side and occasionally has the hind margins of the 5th and 6th segments also pale; some longer white hairs towards each side of 1st segment. Genitalia in ♂ rather large, black or dark brown; in ♀ only the slightly protruding small terminal lamellæ are visible. *Legs*: coxæ brownish yellow or orange, posterior pairs slightly blackish grey at base, all with minute whitish pubescence and a few longer whitish hairs in front and near tip; femora uniformly brownish yellow or orange; tibiæ and tarsi normally black, but middle pair often and hind pair sometimes more or less dirty brownish yellow; tarsi blackish, metatarsus more or less dull yellowish at base; all the legs with microscopic grey pubescence. *Wings* pale grey, highly iridescent; veins black or dark brown, occasionally those near distal end of wing slightly suffused, or the whole wing-tip may be slightly infuscated; halteres wholly yellowish or with a black mark on upper side of knobs.

Length, 6–7 mm.

Described from a number of specimens in good and fair condition in the Indian Museum and Pusa collections: Almora, Kumaon Distr., 5500 ft., 14. v.–10. vi. 1911 (*Paiva*); Dum Dum, W Himalayas, xii. 1906; Baroda, 10. iv. 1909, larva in rubbish in fowl-house; Bombay Presid. (nom. illeg.), 19. iii. 1905; Chapra, Bengal, common; Malda, E. Bengal, 22. iii. 1911 (*Fletcher*); Whatgodam, 23. ix. 1915.

Types in Berlin Museum and Wiedemann's collection.

P. brunneus var. **brunnipes** *Brun.*

P. brunneus var. *brunnipes*, Brunetti, Rec. Ind. Mus. vii, p. 480 (1912).

This variety is distinguished by a broad brown ring on the posterior femora leaving only the base and tip pale; front femora brownish yellow. Scutellum wholly black, with a little greyish

tomentum; abdominal bands milk-white. Wings either clear partly suffused along the veins distally, or the tip faintly suffused.

Three ♀ ♀ from Mandalay, 12. iii. 1908, and Moulmein, 28. ii. 1908 (*Annandale*), all in the Indian Museum.

247. **Phycus argentiventris**, sp. nov.

♂. *Head*: eyes contiguous for a considerable distance; vertical triangle bluish grey; frons and face bluish grey, rather shining; antennal prominence black; antennæ dull brownish yellow, 1st and 2nd joints pubescent; vertical margin and behind upper part of eyes with a row of well-separated black bristles; occiput ash-grey, rather shining in certain lights; lower part with soft white hairs. *Thorax* as in *brunneus*, the median stripe with a bluish tinge. *Abdomen* comparatively flattened above, covered with bluish-grey tomentum, which (seen from in front) glistens silvery white; some sparse white pubescence at sides, longer towards base; hind border of 3rd segment with a narrow yellowish band, rather inconspicuous; traces of a similar band on 4th segment; genitalia large, conspicuous, bright orange with a little black pubescence; venter black, hind margin of at least 2nd, 3rd, and 4th segments with a distinct yellowish band. *Legs*: femora and posterior tibiæ blackish; fore tibiæ and tarsi dull yellowish brown; posterior tarsi pale yellowish, blackish at tip and at tips of joints. *Wings* as in *brunneus*, unmarked; halteres blackish brown.

Length, 7 mm.

Described from a single specimen from Unchogaon, Naini Tal Distr., 13. iv. 1910, in the Indian Museum. Specimens subsequently seen in the British Museum from Periyakulam, Ceylon, 22, 23. ii. 1891 (*Yerbury*).

A very distinct species, characterised by the contiguous eyes and silvery abdomen.

248. **Phycus atripes**, *Brun.*, nom. nov.

Phycus nigripes, Brunetti (*nec* Kröber, 1912), Rec. Ind. Mus. vii, p. 480 (1912).

Allied to *brunneus*, but quite distinct owing to the 3rd antennal joint being evidently longer than the 1st and the wholly black legs. Lower half of frons wholly shimmering silvery white, without the large shining jet-black spot immediately above the antennæ which is so conspicuous in both those forms; 3rd antennal joint cylindrical, much narrower than in the other species. Median dorsal stripe faint; abdominal bands very narrow, milk-white, only the one on the 2nd segment really distinct. Legs wholly black, including coxæ, which have a little bluish-white shimmer. Wings clear, with a distinct blackish suffusion towards tip, extending from the costa over about the distal half of the 2nd longitudinal vein, reaching irregularly to the hind

margin, just encroaching on the discal cell, and with a small irregular clear space in each of the two submarginal cells; halteres with knobs wholly black. From the narrow frons and the appearance of the abdomen I conclude the single specimen is a ♂

Length, 10 mm.

Kurseong, 27. iii. 1910 (*Annandale*).

Type in the Indian Museum.

Family SCENOPINIDÆ.

Head nearly semicircular; frons and face nearly flush with the eyes; three ocelli; epistome short, retreating; proboscis very short, labella broad; palpi short, cylindrical, or slightly clavate. Eyes bare, generally contiguous in ♂, wide apart in ♀; upper facets larger than lower ones in ♂ ♂ with contiguous eyes; in life the eyes with coloured bands. Antennæ three-jointed, placed close together at base, inserted below middle of frons; 1st and 2nd joints short, 3rd elongate, strap-shaped, no style or arista.

Thorax oblong, dorsally rather flattened, with extremely short scaly pubescence on disc and minute pubescence on pleuræ; scutellum broad, short, flat; metanotum rather large.

Abdomen flattened, 7- or 8-segmented, each segment with an impressed transverse line across its middle; ♂ genitalia rather large and knob-like; ovipositor concealed.

Legs generally short, moderately stout; tibiæ unspurred, with a very small bristle or two at tip; two pulvilli, empodium reduced to a bristle.

Wings at rest lying flat on abdomen. Costa ending before wing-tip, ambient vein fading away at about middle of hind margin; auxiliary vein short, ending at middle of wing; 1st and 2nd longitudinal veins ending shortly beyond middle; 3rd vein beginning near base of 2nd, forking rather widely at half its length; anterior cross-vein present, at about middle of discal cell; 4th vein forked, upper branch ending above wing-tip, lower branch forming basal and hinder sides of discal cell, but barely reaching wing-margin; discal cross-vein closing discal cell;* 5th vein forked, upper branch short, ending in lower inner angle of discal cell, lower branch turned down rather suddenly, meeting anal vein some way before wing-margin, closing anal cell; axillary vein indistinct. Upper basal cell long, 2nd short, anal cell long; two submarginal, three posterior cells; alar squamæ small, thoracic squamæ almost absent; halteres normal.

The whole body is devoid of strong bristles.

* Lundbeck considers the discal cell technically absent, treating that space as a 4th posterior cell, because he regards the 4th vein as unforked. Presumably, therefore, he sees the posterior cross-vein in the basal portion of the lower branch of the 4th vein, but he does not actually state that the posterior cross-vein is present.

Life-history. The metamorphoses have been well described by Bouché, Dufour, and others. The larva is amphipneustic, hard, cylindrical, very elongate, apparently of twenty segments, with small head and two small styles at tip of body, moving in a serpentine manner; abdominal segments with transverse rows of bristles. Pupa resembling that of *Thereva*. The larva was at first thought to live on carpets, rugs, and similar articles, but it is now believed that they live on the other larvæ (of TINEIDÆ and PULICIDÆ, for instance) that occur in these habitats. They are certainly carnivorous, and probably feed on the larvæ of many different groups of insects, judging from the various situations in which *Scenopinus fenestralis* has been found.

The SCENOPINIDÆ are a very limited but distinct family, conspicuous by the absolutely bare body and characteristic venation, coupled with the two pulvilli and bristle-like empodium. Their actual relationships have given rise to various opinions, their characters indicating diverse affinities, such as to *Xylomyia*, the THEREVIDÆ, and MYDAIDÆ. Verrall places them with the latter in a super-family, DERMATINA, between the ASILIDÆ and the THEREVIDÆ; Lundbeck and Kertész put them between the THEREVIDÆ and the EMPIDÆ; Schiner with MYDAIDÆ between ASILIDÆ and THEREVIDÆ; Aldrich between THEREVIDÆ and BOMBYLIIDÆ.

Most of the known species belong to the genus *Scenopinus*.

Genus **SCENOPINUS**, *Latr.*

Scenopinus, Latreille, Hist. Nat. Ins. Crust. iii, p. 463 (1802), xiv, p. 392 (1804).
Atrichia, Schrank, Fauna Boica, iii, p. 54 (1803).
Cona, Schellenberg, Gattung. d. Fliegen, p. 66 (1803).
Hypselura, Meigen, Illig. Mag. ii, p. 273 (1803).
Astoma, Lioy (*nec* Oken, 1815), Atti Istit. Veneto, (3) ix, p. 762 (1864).

GENOTYPE, *Musca fenestralis*, L.; by Latreille's designation.

Head transverse, short, semicircular, flattened behind; not closely applied to thorax, but no obvious neck; frons generally flush with eyes; three ocelli; proboscis withdrawn; palpi inconspicuous, cylindrical, tip bristly. Eyes bare, generally contiguous in ♂, in such cases upper facets larger than lower ones; in ♀ wide apart. Antennæ sub-contiguous at base; 1st and 2nd joints short; 3rd elongate, drooping, strap-shaped, normally without style or arista, but if present, it is concealed in a depressed pit. *Thorax* longer than broad; dorsum rather flattened, with a little scaly pubescence; pleuræ minutely pubescent, mesopleura with an obvious depression on front part for reception of the short thick front femora; scutellum short, broad, flat. *Abdomen* rather flat, oblong, tip flattened cone-shaped, 7- or 8-segmented; middle segments bearing a transverse impressed line across the centre;

front margins of some of the middle segments white in the ♂; genitalia in ♂ large. *Legs* short, stout, bare; fore femora shorter and thicker, a few bristly hairs at tips of tibiæ; two small pulvilli, empodium reduced to a bristle. *Wings* with a reduced venation; costa ending before tip of wing, ambient vein dying away beyond the tip; auxiliary vein short; 1st and 2nd veins normal; 3rd beginning at middle of wing, widely forked at half its length; anterior cross-vein at middle of discal cell; 4th vein with upper branch ending before wing-tip, lower branch forming basal and hinder sides of discal cell; discal cross-vein closing discal cell; 5th vein forked, upper branch very short, ending in lower inner angle of discal cell; lower branch turned down rather suddenly, meeting anal vein at some distance before border, closing anal cell; 1st basal cell much longer than 2nd; two submarginal, three posterior cells, 1st narrowed at tip; alulæ well developed; alar squamæ small, thoracic pair hardly developed; halteres small, knobs large.

Range. Europe, Egypt, India, Surinam, Hawaii, N. America.

Life-history. See *S. fenestralis.*

249. **Scenopinus fenestralis,** *L.* *

Musca fenestralis, Linné, Syst. Nat. ed. x, p. 597 (1758).
Scenopinus fenestralis, auctt.

Head, in ♂, dull black, densely and coarsely punctate; frons elongate triangular, almost bare; eyes bare, contiguous for some distance, upper facets larger than and sharply divided from lower ones; vertex practically bare; face reduced to a narrow margin owing to the very small mouth-opening; antennæ brownish yellow or nearly blackish, inserted in a small depression, 1st joint very short, 2nd short, transverse, almost bare, 3rd subulate, four times as long as 1st and 2nd together, slightly narrowed at its blunt tip, where there is a small depression or pit. In ♀, frons one-fifth of the head, roughened by coarse punctation and striæ radiating from the lower ocellus; generally an impressed vertical median line and minute pale pubescence; eye-margins very distinct, rather puffed out behind on upper part, shining black, sometimes grey-dusted; eyes with a transverse purple band across the middle in life; occiput very concave. *Thorax* dull black, with minute scale-like greyish pubescence; humeri and posterior calli more or less chestnut-brown; pleuræ comparatively shining, due to finer punctation, and bearing longer pubescence; both these characters more conspicuous on the sternopleuræ; pteropleuræ shining black, bare. Scutellum like dorsum of thorax, generally a little dark chestnut-brown on underside. *Abdomen* longer than thorax, shining black; 2nd segment twice as long as any other; extreme basal margins in the

* For a very long list of references to this species and for twelve synonyms, see Kertész, Kat. Dipt. v, p 172

♂ of 4th and 5th, and to a less degree of the 6th (or the membrane between them) conspicuously pure white, this colour not reaching the sides;* pubescence practically imperceptible; venter shining black, with chestnut-brown reflections and minute black bristly pubescence; genitalia in ♂ large. In the ♀ the white transverse bands absent; and the 3rd to the 6th segments with a transverse impressed line across the middle of each; ovipositor small, broad. *Legs* shining chestnut-brown; coxæ and trochanters with blackish reflections; femora occasionally, and tibiæ, especially the hind pair, often, with blackish markings; tarsi black, 1st joint more or less chestnut-brown, also first three joints (except the tips) of hind pair; femora rather short and thick, especially fore pair; hind tibiæ slightly curved; pulvilli small, brownish orange. Pubescence of legs weak and pale, forming small fringes behind anterior femora, and a row of rather long pale hairs behind basal half of hind tibiæ; spurs absent, but generally a few bristly hairs that appear like spurs. *Wings* pale

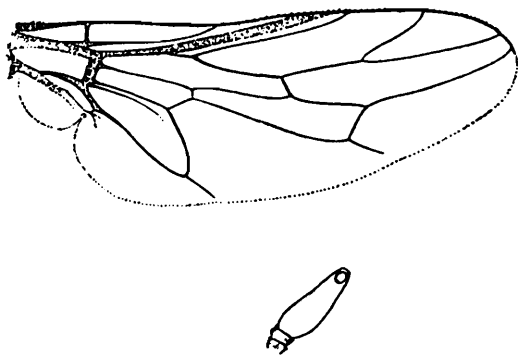

Fig. 22.—*Scenopinus fenestralis*, L., wing and antenna.

brownish grey, veins darker brown; venation in accordance with the generic diagnosis; lower branch of 4th vein and anal vein not quite attaining margin; alar squamæ small, blackish grey, grey-fringed; thoracic pair absent; halteres varying from brown to whitish, sometimes with darker marks.

Length, 5–6 mm., the ♀ generally slightly the larger.

Commonly distributed in Europe and N. America, and the Western Himalayas (hills and plains): Barogh, Simla Hills, 5000 ft., 10. v. 1910, on edge of small stream (*Annandale*); Kasauli, 6300 ft., 15. v. 1908 (*Annandale*); Naini Tal, 3 & 7. vi. 1909; Naini Tal Distr. (plains), 24 & 28. v. 1909. Also recorded from Papua and Hawaii.

The present description of *fenestralis* is an abbreviation of Verrall's, except for the antennæ, as in the Indian specimens these are normally lighter or darker brownish yellow, not blackish. The legs are also more brownish, especially the femora and tibiæ, than in European specimens, these being the only differences.

* In one Indian specimen the white extends over the sides, but this is, no doubt, exceptional.

Life-history. Something of this has been known since the time of Dufour, he, Bouché, Frauenfeld, and others having described it, and the species has been bred on numerous occasions. The larva was at first thought to live on carpets, stable-rugs, horse-hair mattresses, and such-like articles, but it was subsequently found in Polypori, and on willows and other trees. A *Scenopinus* pupa has been found in a cocoon of *Saturnia pyri*, in which were the remains of the *Saturnia* pupa, and the species is said to have been bred from decaying wood. The larva is certainly carnivorous, probably living on the larvæ and pupæ of moths and other insects, possibly of fleas also, found in houses, but evidently breeds in the open air also in a similar manner. The larva is elongate cylindrical, rather tough, of about twenty segments, with small brown head, moving in a serpent-like manner; the pupa being slender, with rows of spines and bristles.

Mr. Verrall notes a curious point about this species, that a large number of females are found with the wing-tip broken off, and suggests that it may be done in pairing. In four European *fenestralis* in the Indian Museum this is the case in two specimens, a third having one wing damaged near, though not actually at, the tip, the fourth being perfect; also in nine Indian *fenestralis* in the same collection only one wing is thus broken, whilst in five European *glabrifrons* all the wings are perfect.

Family MYDAIDÆ.

The MYDAIDÆ are flies of from moderate to gigantic size, easily recognised by their peculiar venation, their projecting club-shaped antennæ, and their bare surface, being wholly devoid of bristles except for a few on the legs. The prevailing colour is black, with, in many species, bands on the abdomen of red or yellow.

Head about as broad as thorax, transverse; neck short and narrow; frons and vertex sunk, making the eyes appear especially prominent; ocelli indistinct, or, when on a prominence, at some distance from the vertex. Proboscis varying from very long and thin, with small labella, to rather thick and short, with labella of considerable size; palpi, when present, one-jointed, long or thin, but generally absent. Eyes bare, wide apart in both sexes, and never with enlarged facets. Antennæ porrect, approximate or touching at base; the two basal joints normal, 2nd shorter than 1st, with a few bristles or stiff hairs; 3rd joint generally elongate, clubbed or knobbed at tip, with traces of annulations.

Thorax subquadrate, with sparse (rarely thicker) pubescence on dorsum, coarse pubescence at sides of dorsum; humeri prominent, pleuræ often with a moderate amount of pubescence; scutellum small though broad, unspined; metanotum very large.

Abdomen elongate, 7-segmented, with light pubescence only; genitalia in ♂ of moderate size, with small foliaceous lamellæ

which are often hidden; ovipositor produced but never elongate, with or without a terminal circlet of spines.

Legs strong and stout, of moderate length; anterior pairs sometimes smaller; hind femora normally slightly thickened, nearly always serrate or spinose below; tibiæ often with a row of small spines on either the middle or hind pair only, or on all three pairs; apical tibial spines absent or sometimes present on all three pairs; hind tibiæ generally with a strong apical spur or two or three bristly spines; tarsi devoid of all but the very small close-set bristles on underside; pulvilli two, moderately large, empodium absent, claws long.

Wings with a very characteristic venation. Auxiliary vein long; 1st longitudinal vein very long, ending at some little distance from wing-tip; præfurca very short, generally extremely so, starting at about one-third of the wing, distinctly before the discal cell; 2nd longitudinal vein always ending in the 1st towards, but not close to, its tip; 3rd longitudinal vein starting very near base of 2nd, always forked at beyond half its length, the branches long, generally curved, and more or less parallel; upper branch ending in the 1st longitudinal just beyond tip of 2nd vein; lower branch ending either at the tip of the 1st vein or in costa just beyond; anterior cross-vein present, short or very short,* placed much beyond middle of wing, towards tip of discal cell; 4th longitudinal vein with both branches either simple or forked, prongs of either branch or of both branches sometimes recurrent;† normally the anterior prong of the upper branch curves upward and ends in the costa well before the wing-tip, sometimes ending at the tip of the 1st vein. In one (non-Oriental) genus (*Mitrodetus*), both branches of the 4th vein curve upwards and end in the 1st vein, but this is exceptional. Posterior prong of upper branch generally recurrent or nearly so; normally the lower branch of the 4th vein ends in the upper branch, often (as in *Mydas*) recurrent and united to the apical portion of the upper branch of the 5th vein. Discal cell always present, elongate, often irregularly or even fantastically shaped (*Mitrodetus*); posterior cross-vein normally situated. The 5th vein forks widely, the upper branch never forming any part of the discal cell, generally curving upwards, joining the lower branch of the 4th vein, or it may be considered to anastomose with the apical part of that vein, thence running jointly with it to the margin;‡ lower branch of 5th vein ending in 6th (anal) vein near its tip;

* Practically, or perhaps actually, absent in only one genus, *Megascelus*, which is not Oriental.

† My reading of the branches of the 4th vein differs from that of Verrall, in which the discal cell is said to emit two or three veinlets.

‡ However, Verrall distinctly says "never running clear to the wing-margin, but always causing a long, closed, normally 4th posterior cell to lie under and parallel with the discal cell." The presence of the closed 4th posterior cell referred to does not alter the position, and the vein that runs from the junction of the 4th and 5th veins to the wing-margin may be regarded as the continuation of either one of them or of the two united.

axillary vein indistinct, perhaps sometimes absent. Alar squamæ small, nearly bare of fringe, but larger and with coarse fringe in *Mydas*; thoracic squamæ absent.

Life-history mainly unknown, except that the larvæ are said to live in decaying wood and to resemble those of the ASILIDÆ. Williston states that the larva of a North American species (*Mydas fulvipes*, Walsh) preys upon Coleopterous larvæ, and notes the pupa of *M. clavatus*, Drury. The perfect insects have been accused of being predatory, but there seems to be little decisive evidence on the matter. An Egyptian species is said to be predatory on other insects, catching them in the air; and another species is recorded as parasitic on the larvæ of Longicorn beetles (PRIONIDÆ).

The MYDAIDÆ occur chiefly in the New World and Australia, only about 15 species being Palæarctic and six Oriental, of which four are Indian.

Their peculiar venation differentiates them easily from all other groups, except the NEMESTRINIDÆ and APIOCERIDÆ. These latter are a small non-Oriental group that has been at various times associated with the BOMBYLIIDÆ, THEREVIDÆ, and ASILIDÆ. There is some resemblance in the venation of the MYDAIDÆ to that of the NEMESTRINIDÆ, but the bodily structure and general facies of the latter are different.

The presence also in the NEMESTRINIDÆ of what has been conveniently though incorrectly termed the "diagonal vein" will also immediately separate that family from the present one.

Verrall has carefully analysed the systematic position of the present family (Brit. Flies, v, p. 605), and in the same volume (p. 606) has discussed the question of spelling, several authors having adopted *Midas* instead of *Mydas*. The exact origin of the generic name is not clear, and he supports *Mydas*, with the family name MYDAIDÆ, and these terms are also adopted in the Kertész Catalogue and in Williston's Manual.

Table of Genera.

Proboscis short; labella terminal, triangular, compressed; hind tibiæ generally with a spur; anal segment in ♀ without a wreath of spines .	MYDAS, F.
Proboscis long; hind tibiæ without spur; anal segment in ♀ with a wreath of spines	[Gerst. LEPTOMYDAS,

Genus **MYDAS**, *F.*

Mydas, Fabricius, Ent. Syst. iv, p. 252 (1794); Macquart, Hist. Nat. Dipt. i, p. 273 (1834); id., Dipt. Exot. i, pt. 2, p. 10 (1838).

GENOTYPE, *Musca clavata*, Drury; by Latreille's designation (1810).

Head broad, short transverse, as broad as thorax, neck short;

frons and vertex sunken, ocelli indistinct or removed far from vertex; proboscis only slightly prominent,* labella terminal, triangular, compressed; palpi one-jointed; antennæ porrect, at base approximate, clubbed or knobbed at tip, three-jointed, the first two moderately short, the 3rd elongate, with annular impressions. *Thorax* subquadrate, with sparse, sometimes thicker pubescence on dorsum and coarse pubescence towards the sides; pleuræ with more pubescence in some species than others; humeri prominent; scutellum oblong, small, unspined, metanotum very large. *Abdomen* elongate, 7-segmented, with light pubescence only, the last segment in the ♀ without a circlet of spines; genitalia of moderate size in ♂ *Legs* strong and stout; hind femora slightly thickened, generally serrate or spinose on underside; hind tibiæ generally with a spur. *Wings*: auxiliary, 1st, 2nd, and 3rd longitudinal veins as in the family diagnosis, both branches of the latter vein ending in the 1st; the 4th vein's upper branch ends in the costa distinctly before the wing-tip, its lower branch bends downward and joins the upper branch of the 5th vein. As for the small vein forming the outer side of the discal cell, it may be regarded as a lower prong of the upper branch of the 4th vein or as a discal cross-vein. Remaining veins in accordance with the family diagnosis.

Range. S. Europe, N. Africa, India, Malay Archipelago, North and South America, and Cuba.

Life-history practically unknown.

Table of Species.

Third antennal joint bright red .	*ruficornis*, Wied.
Third antennal joint black.	
Abdomen wholly black ..	*carmichaeli*, Brun.
Abdomen with pale hind margins to segments	*annulata*, Brun.

250. Mydas ruficornis, *Wied.*

Mydas ruficornis, Wiedemann, Analec. Entom. p. 20 (1824); id., Auss. Zweifl. i, p. 242 (1828); id., Monog. Gen. *Midas*, p. 46, pl. lii, fig. 11.

"Head black; 1st and 2nd antennal joints black, 3rd fiery red-yellow; epistome on both sides [presumably above and below] with yellowish hairs; a white hair spot on the side of the antennæ; occiput whitish. Thorax brownish honey-yellow, becoming blackish behind. Abdomen almost metallic black, rather sparsely punctured. Wings brown, with violet-blue reflections; halteres brown. Legs black; hind tibiæ and base of tarsi dark red-brown; hind femora below with three or four rather long spines." (*Wiedemann.*)

Length, 18 mm.

Tranquebar.

Type in the Vienna Museum.

* Schiner adds "with four bristles."

251. **Mydas carmichaeli,** *Brun.*

Mydas carmichaeli, Brunetti, Rec. Ind. Mus. ix, p. 266 (1913).

♂ ♀ *Head* black, frons slightly wider than one-third of the head, somewhat wrinkled, with a moderate amount of blackish-brown pubescence; a small tuft of greyish hairs on each side of the mouth-opening. Proboscis rather less than the height of the head, dark brown; palpi slender, black, reaching as far forward as the vertical line drawn through the antennal prominence, which latter is small and black. Antennæ normal, black, bare, about as long as from the vertex to the tip of the proboscis. Occiput black, shortly pubescent; a little grey tomentum behind the eye-border. *Thorax* wholly dull velvet-black, with very short sparse black pubescence, which is a little longer below the wings.

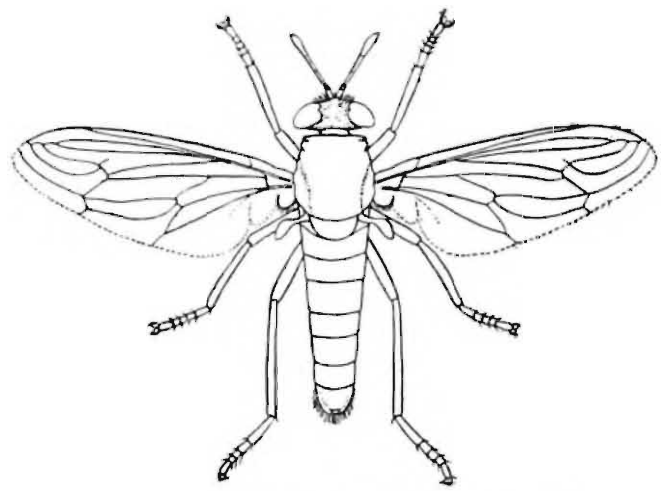

Fig. 23.—*Mydas carmichaeli*, Brun., ♂.

Abdomen shining black, with a slight indigo-blue tinge and very short pubescence; in ♂ subcylindrical, as long as head and thorax together and barely as wide; in ♀ a little broader and longer and much more bulky. The ♂ genitalia consist of a hollow triangular piece, hairy above, with a deep keel, a pair of dark reddish-brown, nearly bare, moderately long, narrow, finger-like claspers (only one joint being visible, the organs being somewhat withdrawn), and a curved ventral plate, with black pubescence on its lower side. The ♀ genitalia appear to consist of two telescopic cylindrical shells, the inner one ending in two small (probably) retractile lamellæ. *Legs* wholly black; coxæ with a little short black pubescence; hind femora with two rows of spines on underside, an inner one of about a dozen and an outer one of a few only. Hind tibiæ with a row of reddish spines on underside (not at all conspicuous), and 5 or 6 such spines at the tip on the underside only; fore tibiæ with some inconspicuous spines at tip, which appear to be only the terminal ones of a row on the underside nearly hidden by the thick though short black pubescence which clothes all the tibiæ; a row of spines, including the apical ones, is apparently present on the middle tibiæ also, though certainly

much less conspicuous. Claws distinct, pulvilli pale brownish-yellow. *Wings* dark blackish brown, a little paler towards tip and hind margin, and with a strong violet tinge. Halteres and squamæ black, the latter with a narrow fringe of dark brown hairs.

Length, ♂ 25 mm., ♀ 27 mm.

Described from a single pair, the ♂ from Darjiling, v. 1912, the ♀ from Singla, iv. 1913.

252. **Mydas annulata**, *Brun.*

Cephalocera annulata, Brunetti, Rec. Ind. Mus. vii, p. 513 (1912).

♂. *Head*: frons rather more than one-third width of the head, with a small swelling on each side of vertex, contiguous to the corners of the eyes; proboscis short. The whole head moderately shining black, with rather thick and long whitish-grey pubescence over frons and face except lower part of the latter; occiput black, with whitish-grey hairs, which are longer on lower part of head. Antennæ all black, long; 2nd joint very short, 3rd joint with an impressed constriction at some distance before its tip; beyond the constriction the joint is slightly thickened; style long, nearly as long as rest of antennæ, black, with an impressed constriction at nearly one-third of its length, the style thickening apically except at extreme tip, where it is slightly but obviously narrower. *Thorax* black, a grey tomentose stripe at each side of the dorsum, a short one from each shoulder, narrowing rapidly and not reaching centre of dorsum; the middle of the posterior margin also grey tomentose; the whole dorsum covered with fine grey pubescence, which is a little longer below the shoulders and on the side stripes. Scutellum broad, extremely short, shining black, bare; sides of thorax moderately shining black, with a little grey pubescence on the pleuræ. *Abdomen* shining black; posterior margins of all segments (indistinctly on the 1st segment) with a narrow, but clearly-defined, pale whitish-yellow border; whole surface of abdomen with depressed pubescence, which is dark brown or blackish on basal half (or thereabouts) of each segment and pale grey on apical half. Venter similar, the yellowish-white bands passing over the sides of the segments and continued narrowly across the ventral surface. Genitalia comparatively small, black; a dorsal plate, a pair of moderately long finger-like claspers, and some yellowish-brown internal organs. *Legs* black; shortly and normally grey pubescent; base of hind tibiæ and tarsi slightly brownish yellow. *Wings* pale grey; venation in exact agreement with Macquart's figure of *Cephalocera nigra* (Dipt. Exot. i, pt. 2, pl. i, fig. 3); halteres black.

Length, 15 mm.

Described from two ♂ ♂ in the Indian Museum from Bhoirakund, Darrang District, Assam-Bhutan Frontier, 18–22. x. 1912 (*Kemp*).

I described this species under *Cephalocera*, as Bigot's MS. name for it was adopted, but, as the proboscis is short and labella are present, it must be referred to *Mydas*.

Genus **LEPTOMYDAS**, *Gerst.*

Leptomydas, Gerstaecker, Stett. Ent. Zeit. xxix, p. 81 (1868).

GENOTYPE uncertain; * *Mydas lusitanicus*, Wied., according to Coquillett (1910).

This genus differs from *Mydas* in the long proboscis, in the absence of a spur to the hind tibiæ, and the presence of a wreath of spines at the tip of the abdomen in the ♀ From *Cephalocera* it differs by the presence of the labella.

Range. South Europe, Egypt, Arabia, Sudan, India, East and South Africa, North and Central America.

253. **Leptomydas indianus**, *Brun.* (Pl. IV, fig. 1.)

Leptomidas indianus, Brunetti, Rec. Ind. Mus. vii, p. 478, fig. 12 (1912).

♀ *Head* much wider than thorax; frons black, shining, with two narrow diagonal grooves on upper part; vertex consisting of two dark brown shining oval calli placed end to end, with a small recessed space between them; face rather dark grey, smooth; antennæ missing, except the short, cylindrical, dark brown, slightly pubescent first joint, placed on a slight transverse ridge running from eye to eye; eyes prominent, black, bare, shining; proboscis and oral opening dark brown, shining, former very short; back of head grey; the whole frons, face, back, and underside of head with moderately thick (but not dense) grey hairs. *Thorax* dull black, with a little dirty grey tomentum towards the sides and posterior part, and on the humeral calli, which bear a small bunch of concolorous hairs; similar hairs on posterior part of dorsum, in front of and below the wings; sides of thorax more or less shining black, mostly bare; prothorax and neck with silvery-grey tomentum; scutellum and metanotum blackish, with silvery-grey tomentum. *Abdomen* cylindrical, slightly narrowed in middle, very dark blackish brown, shining; posterior borders of segments pale yellow, most distinct on 2nd to 5th segments; the bands on the 2nd, 3rd, and 4th segments passing unbroken over the sides and across the venter; 4th segment light reddish brown; whole abdomen minutely pubescent; 1st and 2nd

* There is a little uncertainty here, as in the Kertész Katalog *lusitanicus* is referred to *Mydas* again, although *Leptomydas* is acknowledged as a valid genus. The next species given by Gerstaecker is *cinctus*, Macq., which Kertész puts in *Syllegomydas*. Gerstaecker's third species is *rufipes*, Wied., which Kertész retains in *Leptomydas*. Therefore, if *lusitanicus* is really a *Mydas*, the type of *Leptotomydas* may be *rufipes*, Wied.

segments with grey hairs at sides. Genitalia small, partly withdrawn, dark shining brown; ultimate portion with a row of light brown scale-like spines on each side. *Legs* simple, no traces of bristles or longer hairs, except two apical bristles at the tips of the anterior tibiæ (the hind tibiæ and tarsi are missing); dark brown, with minute grey pubescence, which is longer on the coxæ and short and thick on the tibiæ; tarsal joints with black tips. *Wings* uniformly pale yellow, veins darker yellow, costa black; border of wing without a single hair; 3rd longitudinal vein with a minute appendix at base of upper fork; alulæ concolorous, bare; tegulæ very small, bright yellow with a very narrow fringe; halteres blackish, stem brown.

Length, 16 mm.

Described from a single ♀ in the Indian Museum from Sadiya, Assam.

The type is a ♀, as noted on Bigot's MS. label, though in describing it I stated it was probably a ♂ I placed *indianus* in *Leptomydas* because Bigot's MS. label bore that name, but an examination of the various genera shows that in this genus the proboscis should be long. In *indianus* it only projects from the mouth-opening for a short distance, the tips of the distinct labella reaching as far forward as the 2nd antennal joint. The only other genus to which it could be referred seems to be *Ectyphus*, Gerst., in which the proboscis is described as rudimentary, barely projecting from the oral orifice. But the epistome in *Ectyphus* is long and vertical, whereas in *indianus* the lower part of the head does not descend below the level of the eyes. The proboscis in the type projects upwards at an angle; if directed forwards, it would, of course, appear comparatively longer: Gerstaecker's figure shows a proboscis reaching to half the length of the antennæ. However, the tip of the abdomen bears the circlet of spines, which is one character that differentiates *Leptomydas* from *Mydas*, so in the circumstances the species is left here temporarily.

Family EMPIDÆ.*

Comparatively small-sized flies, generally bare or nearly so except for a few bristles, of sombre colours; † found chiefly in woods and shady situations, many species frequenting the neighbourhood of water. In the tropics they occur mostly in localities of some elevation. Systematically much more variety of structure is present than in the adjacent families of ASILIDÆ and DOLICHOPODIDÆ.

* Some authors adopt the name EMPIDIDÆ. The late G. H. Verrall says (Brit. Flies, v, p. 28): "Dr. A. W. Verrall is of opinion that the word *Empididæ* is pedantic, and instances *Euelpidæ*."

† The only exceptions are a few metallic species from the tropical regions of the New World.

Head comparatively small, sometimes very small, more or less globular, generally bulging out posteriorly; as wide as, or narrower than the thorax; joined to the thorax by a narrow neck. Eyes large, often forming nearly the whole of the head, generally bare, contiguous in both sexes or in the ♂ only, or separated in both sexes; in contiguous eyes the upper facets nearly always larger than the lower ones; in the middle of the inner eye-margin is an incision of greater or less size, said to be always present and perceptible; three ocelli. Proboscis of various structure; short and thickened, of more moderate size both in thickness and length; or, as is frequently the case, horny, adapted for piercing, directed forwards; or elongate, in some species as long as the whole body, and directed obliquely forwards, downwards, or backwards. Occasionally the proboscis is curved. Mouth-opening generally small. Palpi generally 1 or 2, rarely 3, jointed; of various structure, size, and length; bare or bristly. Antennæ porrect, approximate at base, sometimes 2-jointed, generally of three unquestionable joints, of which the 3rd may taper into, or bear, an arista, which is always bare except when styliform. In some genera a prominent 1- or 2-jointed style is present, and some authors have described such antennæ as being 4- or 5-jointed. Even in certain genera in which they are regarded as 3-jointed, the 3rd joint (in these cases nearly always elongate conical or pear-shaped) is apparently of a different texture from the basal two, partaking more of the nature of a style. In the present work the latter genera are regarded as having a 3-jointed antenna, attention being called to the structure of the 3rd joint. In the genera with so-called 4- or 5-jointed antennæ the 4th and 5th joints are regarded as representing a style. Head with a few weak bristles on vertex, frons, or occiput.

Thorax of moderate size, often greatly humped, generally subquadrate, the prothorax sometimes produced forwards. Scutellum small, semicircular, or gently curved, with two or more bristles; a few bristles generally occur on the margin of the thoracic dorsum.

Abdomen of 7 or 8 segments,* bare or pubescent; generally in the ♂ elongate, conical, or cylindrical, in some genera short, rounded, or ovate; in the ♀ sometimes broader at the base, but always more pointed at tip. Genitalia in ♂ of various structure, sometimes complex and prominent; in ♀ usually in the form of a slender conical ovipositor with two terminal styliform lamellæ. Abdomen never with conspicuous bristles.

Legs exhibiting various forms of structure. In some groups they are comparatively normal, that is to say, of moderate length and thickness; but in others the coxæ may be greatly lengthened, the femora (either pair singly or the whole of them) being often conspicuously incrassated, and in some genera furnished with spines below. The tibiæ and metatarsi are sometimes enlarged, whilst marked differences in sexual ornamentation not infrequently

* Melander says 5 to 7.

occur in the legs in certain genera—*Erupis* and *Rhamphomyia*, for instance,—in which in some species those of the ♂ are provided with knobs or characteristic spines or tufts of hair, whilst those of the ♀ in other species may be adorned with long scales forming a conspicuous fringe. Tibial spurs sometimes present, never large; two fairly well-developed pulvilli and generally an empodium of varying shape. Bristles of various sizes and specific value occur on the legs of many species. Some species have raptorial legs.

Wings usually of moderate size and normal shape, about as long as the abdomen; in one group narrow and markedly cuneiform, the anal angle not distinguishable; in certain genera widened and considerably shortened; practically bare, except for a fringe of tiny bristles along some part of the costa; in the large majority of species unmarked, except for slight infuscations and the stigma, when present. Venation exhibiting considerable variety. Costa usually ending near apex of wings; auxiliary and 1st longitudinal veins of varying length, the former sometimes shortened; 2nd longitudinal vein long, simple or forked; 3rd ending before or after wing-tip, simple or forked; 4th simple or forked, the upper branch often again forked; 5th simple or forked, the lower branch often recurrent, meeting anal vein at various angles; anal vein present or absent, sometimes much abbreviated. Anterior cross-vein present; posterior cross-vein always absent; a discal cross-vein present or absent. One or two submarginal cells, three or four posterior cells, discal cell present or absent; two basal cells; anal cell present, incomplete, or absent. Anal angle of wing prominent, moderately distinct, or entirely reduced. Squamæ generally absent, when present, small. Wings covering the abdomen when at rest.

The EMPIDÆ are a rapacious family, preying chiefly on small soft Diptera and, to a less extent, on Lepidoptera, for which they lie in ambush amongst leaves. Generally distributed, especially in woods in moist situations. In some species aerial dances are performed either by one or other sex or both jointly, copulation in these cases taking place in the air. Other species frequent flowers. Some are fond of hovering in swarms just above small ponds and streams, and mate on the surface of the water. I once saw near London (at Esher, I think) a dense and regular stream of *Hilara maura* flying slowly backwards and forwards over a brooklet, so that a single stroke of the net captured several hundreds.

Life-history. Larva amphipneustic; prothoracic spiracles small, abdominal spiracles also small, placed on last segment, which is more or less rounded, bearing a tooth-like wart on underside; 12-segmented, cylindrical, tapering at each end; head small, retractile, mouth-parts rather well developed, antennæ small, no eyes; ventral side of most segments with transverse swellings. The larva is carnivorous, living in the earth below leaves in woods, or in decaying wood; one European species of *Hemerodromia* apparently lives in the mud of streamlets. Pupa free, with prothoracic and seven pairs of abdominal spiracles.

The EMPIDÆ may be distinguished from the ASILIDÆ by the difference in venation, non-excavation of the vertex, smaller head, and absence of long hair on the lower part of the head. From the DOLICHOPODIDÆ, to which certain genera bear some resemblance, they may be known by the venation. A few genera with reduced venation may have a superficial resemblance to some ACALYPTRATA, but the family characters described above will separate them. The subfamilies are not so easily distinguished as in some other families, and, as a rule, more than one character has to be taken into consideration in separating them.

Table of Subfamilies.

1. Anal cell absent, or, if present, anal vein incomplete and middle femora usually incrassate; anterior cross-vein nearly always beyond middle of discal cell	TACHYDROMIINÆ, p. 373.
Anal cell present, rarely absent, in which case fore coxæ much elongated, about as long as the incrassate fore femora; anterior cross-vein always much before middle of discal cell (except in *Hemerodromia* spp.)	2.
2. Axillary lobe of wing greatly reduced or absent; wing cuneiform at base; fore coxæ much elongated, about as long as fore femora, always longer than posterior coxæ	HEMERODROMIINÆ, p. 363.
Axillary lobe of wing generally normally developed or conspicuous; wing not cuneiform; fore coxæ always shorter than fore femora ..	3.
3. Anal cell always distinctly longer than 2nd basal cell; lower branch of 5th vein bent down to meet anal vein always at an obvious obtuse angle, and approximately perpendicular to hind margin of wing; posterior margin of anal cell always the longer, its apical end never truncate; proboscis shorter than height of head; if longer, directed straight or obliquely forwards and also antennæ and style very short; 3rd vein always simple; thorax generally conspicuously humped	HYBOTINÆ, p. 325.
Anal cell shorter than, or at most approximately subequal to 2nd basal cell; lower branch of 5th vein bent down to meet anal vein at an acute angle, a right angle or at most only slightly obtuse angle; approximately either perpendicular to, parallel with,	

or at an angle of about 45° to hind margin of wing; anal cell with either anterior or posterior margin the longer, its apical end truncate or pointed; proboscis generally shorter than or as long as height of head, sometimes longer; 3rd vein simple or forked; thorax humped or not 4.

4. Proboscis as long as or longer than head,* projecting downwards; lower branch of 5th vein parallel to hind margin of wing, so that anterior margin of anal cell is always the longer; antennæ comparatively elongate, generally with 2-jointed style; 3rd vein simple or forked.. .. EMPINÆ, p. 344.

Proboscis generally quite short; if as long as head or longer, directed straight or obliquely forwards, also 5th vein meeting anal vein at an angle of about 45°, also antennæ and style very short. Antennæ variable; lower branch of 5th vein meeting anal vein parallel with, perpendicular to, or at an angle of 45° to hind margin of wing; 3rd vein simple OCYDROMIINÆ, p. 362.

Subfamily HYBOTINÆ.

Eyes contiguous in both sexes; proboscis varying from shorter than, to a little longer than the head; palpi of one joint; antennæ 3-jointed, with a terminal arista.* Thorax very humped. Wings with axillary lobe well developed; 3rd longitudinal vein simple, 4th simple or forked; three or four posterior cells; discal cell generally present;† 2nd basal cell equal to or longer than 1st; anal cell longer or shorter than 2nd basal; anal vein reaching margin of wing; lower branch of 5th vein bent down rather suddenly, at an obvious obtuse angle, meeting anal vein approximately perpendicularly to hind margin of wing, making posterior side of anal cell always the longer, and its apical end pointed.

The characters by which this subfamily may be most easily recognised are the elongated anal cell, pointed at tip, in conjunction with the obtusely bent lower branch of the 5th vein; also by the very humped thorax. They are strongly built Empids and of comparatively large size.

* *Trichopeza* is almost an exception, the proboscis being barely as long as the head.

† *Microsania*, Zett., a European genus, has a two-jointed style to the 3rd antennal joint and the discal cell absent.

Table of Genera.

1. Second longitudinal vein beginning nearer humeral cross-vein than anterior cross-vein	2.
Second longitudinal vein beginning nearer anterior cross-vein than humeral cross-vein	4.
2. Anal cell ending much before margin of wing	3.
Anal cell extending to margin of wing	HARPAMERUS, Big., [p. 334.
3. Hind femora incrassate, spined below	SYNECHES, Walk., [p. 327.
Hind femora not incrassate nor spined below	ACARTERUS, Lw., [p. 334.
4. Basal portion of 4th vein (dividing basal cells) indistinct	SYNDYAS, Lw., p. 333.
Basal portion of 4th vein (dividing basal cells) distinct	5.
5. Hind femora incrassate; thorax very humped; arista apical	HYBOS, Mg., p. 336.
Hind femora not incrassate; thorax less humped; arista subapical	PARAHYBOS, Kert., [p. 343.

These characters are mainly comparative, especially as regards the origin of the 2nd longitudinal vein. The degree of incrassation of the hind femora and the size of the spines on its underside are both variable characters. The sole characteristic of *Syndyas* seems a very weak one, whilst that distinguishing *Harpamerus* appears very strong, yet the latter is sunk in *Syneches* in Kertész's Catalogue. Both these latter genera are unknown to me. It is difficult to draw definite generic limits in HYBOTINÆ without an exhaustive examination of all the known species.

Table of Species of Syneches (sensu lato), Syndyas, *and* Harpamerus.

1. Anal cell extending to wing-margin ..	*signatus*, Big., p. 334.
Anal cell ending much before wing-margin	2.
2. Thorax bright brownish yellow.	*immaculatus*, Brun., [p. 328.
Thorax black, blackish brown, or dark brown	3.
3. Wing with several dark brown marks, apart from stigma	*bigoti*, Bezzi, p. 329.
Wing unmarked, apart from stigma; ground-colour from clear to brownish	4.
4. Discal cell unusually small. ..	*parvicellulata*, Bezzi, [p. 333.
Discal cell at least more than twice as long as broad	5.
5. Legs, at least femora (except extreme base or tip), all yellow . ..	6.
Legs mainly black or dark brown, at least all femora practically so (except hind femora in *rusticus*)	7.
6. Thorax less arched; legs with soft pubescence in addition to tibial bristles; anal cell considerably longer than 2nd basal, with subconical tip	*inæqualis*, Brun., p. 330.

Thorax highly arched; legs nearly bare except for tibial bristles; anal cell barely longer than 2nd basal, with nearly truncate tip ...	*minutus*, Brun., p. 330.
7. Hind femora brownish yellow .	*rusticus*, Brun., p. 331.
Hind femora black or blackish brown .	8.
8. Smaller species, $2\frac{1}{2}$ mm.; wings nearly clear	9.
Larger species, $3\frac{1}{2}$ or 5 mm.; wings distinctly brown	10.
9. Stigma very distinct and large, round, deep black; anterior cross-vein at about $\frac{1}{8}$ of discal cell; anterior knees and tips of anterior tibiæ and all tarsi wholly yellow; hind femora considerably thickened on apical half	*insignis*, Brun., p. 332.
Stigma barely appreciable; anterior cross-vein at about $\frac{1}{4}$ of discal cell; only tarsi and extreme tips of tibiæ yellow; hind femora not thickened..... .	*fratellus*, Brun., p. 332.
10. Length $3\frac{1}{2}$ mm.; 1st posterior cell (beyond discal cell) distinctly narrowed towards tip	*palliditarsis*, Brun., [p. 331.
Length 5 mm.; 1st posterior cell (beyond discal cell) uniformly wide.	*fuscipennis*, sp. n., p. 333.

Acarterus, Lw., with two Indian species is not included in the above table, as its unthickened unspined hind femora should distinguish it clearly; but *Harpamerus* is included, although the length of the anal cell should define it with absolute precision. The fact that Prof. Kertész sinks it in *Syneches*, however, makes me dubious of its generic validity, Bigot's definitions being often unreliable.

Of the species tabulated above, *signatus* belongs to *Harpamerus*, and *parvicellulata* to *Syndyas*, the remainder falling in *Syneches*.

Genus **SYNECHES**, *Walk.*

Syneches, Walker, Ins. Saund., Dipt. pt. 3, p. 165 (1852).
Acromyia, Latreille, Gen. Crust. Ins. iv, p. 305 (1809).
Pterospilus, Rondani, Dipt. Ital. Prod. i, p. 152 (1856).

GENOTYPE, *Syneches simplex*, Walk. (South America).

This genus differs technically from *Hybos* by the origin of the 2nd longitudinal vein being nearer to the humeral cross-vein than to the anterior cross-vein. It is also urged that the 2nd longitudinal vein curves forward more in *Syneches* than in *Hybos*; also that the anal cell is almost truncate at the tip in the former and pointed in the latter; again, that the wings are normally spotted in *Syneches* and unmarked in *Hybos*.

Range. Europe, India, Ceylon, Malay Archipelago, South Africa, North and South America.

As regards the generic validity of *Syneches*, there is considerable doubt, the principal character of the position of the origin of the 2nd longitudinal vein being much weakened by the existence of

several intermediate species. Melander adds that the 2nd longitudinal vein is curved towards the costa, and the wings (except in one species, dealing with the North American ones only) are spotted in *Syneches*.

In describing three new Indian species,* it was noted by me that so far as the origin of the 2nd vein went they might almost as well be placed in *Hybos* as in *Syneches*. Melander's figure of *H. spinicosta* shows this species also as practically intermediate; whilst in that of *mellipes*, though the humeral cross-vein is not figured, the origin of the 2nd vein appears also in an intermediate position. Respecting the curvature of the 2nd vein, Melander's figures show it as much curved forward in *H. mellipes* as in *S. quadrangularis*.

The anal cell is said to be nearly truncate at the tip in *Syneches* and pointed in *Hybos*, but there is practically no difference in this respect in the wings of *S. simplex* and *H. mellipes*. The character of the wing being generally spotted in *Syneches* is a weak one.

It may be as well, however, to retain *Syneches* provisionally, though it is probably only worthy of subgeneric rank.

From *Epiceia*, Walk., and *Harpamerus*, Big., taken together, *Syneches* (*s. str.*) is supposed to differ by the 3rd and 4th longitudinal veins being parallel or diverging at the tip, instead of converging at the tip.

My own species must be considered as belonging to *Syneches*, *sensu lato*.

254. **Syneches immaculatus**, *Brun.*

Syneches immaculatus, Brunetti, Rec. Ind. Mus. ix, p. 18 (1913).

♂ *Head* dark grey; upper facets of eyes reddish brown, very much larger than the lower ones, which are coffee-brown; proboscis about as long as height of head, yellow; palpi very small, yellow, with a long bristle at the tips; antennæ bright pale

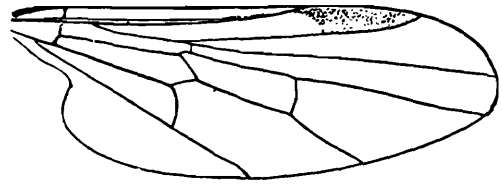

Fig. 24.—*Syneches immaculatus*, Brun., wing.

yellow, with a very long bisinuate drooping black arista. *Thorax* bright brownish yellow, with a few sparse hairs and four bristles towards posterior margin; scutellum concolorous, with two long apical bristles; metanotum concolorous; sides of thorax also, an irregular elongate dark brown spot or streak from the shoulder to the base of the wings. *Abdomen* wholly black, with a little black pubescence on upper- and undersides; genitalia small. *Legs* yellow; fore femora a little brown above, with short golden-

* Rec. Ind. Mus. ix, p. 17; list of Oriental species and notes, p. 16.

yellow pubescence; all the tibiæ with a row of well-separated long stiff dark hairs. *Wings* pale grey, unmarked except for the distinct brownish-yellow stigma; halteres brown.

Length, 4 mm.

Described from one ♂ in the Indian Museum from Peradeniya, Ceylon, iv. 1911 (*E. E. Green*).

255. Syneches bigoti, *Bezzi*. (Pl. IV, fig. 3.)

Syneches bigoti, Bezzi, Ann. Mus. Hung. ii, p. 360 (1904); Brunetti, Rec. Ind. Mus. ix, p. 16 (1913).

Pterospilus bicolor, Bigot, Ann. Soc. Ent. France, (6) ix, p. 126 (1889).

♂ ♀ *Head* with eyes closely contiguous in both sexes from vertex nearly to base of antennæ, leaving extremely small vertical and frontal triangles; frontal bright brown facets from vertex to lower margin of eye considerably larger than the hindmost black ones, the size gradually diminishing; face moderately broad, blackish, with a little whitish pubescence immediately below base of antennæ; the three conspicuous ocelli bright brown; vertex with a row of short black bristly hairs; antennæ wholly brownish yellow, 1st and 2nd joints sometimes darker, the 2nd with a fringe of black bristles towards tip; arista pale yellow, more than twice as long as antennæ; epistome, proboscis, and palpi bright brownish yellow, the last with two or more long bristles and a row of short stiff hairs; occiput black, with a little pubescence. *Thorax* wholly bright yellowish brown, with three well-separated, moderately wide, more or less distinct darker stripes from anterior to posterior margins; the whole dorsum with very short black pubescence. Scutellum varying from pale yellow to yellowish brown, with a row of short black bristles on hind margin. *Abdomen* brownish yellow; hind margins and sides of segments more or less blackish, with yellow pubescence at sides. In the ♀ the abdomen more yellowish grey, rather broader basally, conical at tip, and shorter in ♂ Venter from pale yellow to yellowish brown; genitalia in ♂ of moderate size. *Legs*: anterior pairs pale brownish yellow, sometimes the anterior femora or anterior legs wholly much darker; hind legs always darker than anterior pairs, normally with a very broad darker brown subapical band on femora, sometimes a similar basal brown band, but less distinct; sometimes the hind femora entirely darker brown; hind tibiæ darker brown, basal and apical thirds usually darker still; hind tarsi pale yellowish, tips of all tarsal joints brownish. Hind femora with soft, black, moderately long pubescence and a row of 8–9 long bristles on outer side and a row of about twelve short socketed spines below; anterior legs with soft short pubescence on femora and tibiæ and hind tibiæ also; a row of long stiff hairs below femora and some isolated ones placed apparently irregularly on the tibiæ. *Wings* pale grey; veins brown, but pale yellow on some of the non-infuscated parts and contiguous to the stigma; these infuscations are somewhat irregular in outline and of more or less distinctness,

and occur as follows: in the middle of the wing (narrowly) from costa to discal cell, along basal part of 5th longitudinal vein, and to a slight degree along many of the other veins, at tip of 2nd vein (where there is often a short appendix), and a slight but usually obvious limited suffusion at the wing-tip; stigma very large, deep black, round or slightly oval; halteres brownish yellow.

Length, 4–5½ mm.

Redescribed from two males and several females in the Indian Museum: Margherita, Assam; Peradeniya, i. 1911; Kandy, v. 1910; Pallode, S. India, 15. xi. 1908 (*Annandale*); Parambikulam, Cochin State, 1700–3200 ft., 16–24. ix. 1914 (*Gravely*).

256. **Syneches inæqualis**, *Brun.*

Syneches inæqualis, Brunetti, Rec. Ind. Mus. ix, p. 18 (1913).

♂ *Head* with occiput dark grey; proboscis about as long as head; antennæ blackish grey, arista considerably pubescent. *Thorax* shining black. *Abdomen* dull blackish grey (if viewed from in front it appears a lighter grey), greyish towards tip; pale hairs laterally. Genitalia comparatively large, apparently normally formed. *Legs* wholly yellowish, except tips of femora, which are exceedingly narrowly black; legs softly and distinctly pubescent, the tibiæ with three or four long stiff bristly hairs on each. *Wings* pale brownish yellow; stigma oval, indistinct, of moderate size.

Length, 3 mm.

Described from a single ♂ in the Indian Museum from Kurseong, 3. viii. 1908 (*Annandale*).

257. **Syneches minutus**, *Brun.*

Syneches minutus, Brunetti, Rec. Ind. Mus. ix, p. 20 (1913).

♂ *Head* with upper facets of eyes large, reddish; lower ones nearly black, much smaller; vertex and occiput black; three distinct small yellowish ocelli; antennæ brown, pale if viewed from above, as is also the arista; proboscis light brownish yellow, a little longer than the head. *Thorax* very highly arched; dark blackish brown, a little shining; seen from certain directions the hinder half has a brown-dusted tinge; some long stiff hairs laterally. Scutellum with a distinct brown or brownish-grey tinge, and with long stiff hairs. *Abdomen* blackish brown, with some dark hairs; genitalia black, apparently normally shaped and of moderate size. *Legs* pale brownish yellow; coxæ and sometimes extreme base of anterior femora and extreme tips of tarsi dark; legs almost bare except for one or two long stiff hairs on tibiæ. *Wings* pale brown, stigma imperceptible, halteres black.

Length, 2 mm.

Described from four ♂ ♂ in the Indian Museum from the western base of the Dawna Hills, Lower Burma, 1–2. iii. 1908 (*Annandale*).

258. Syneches rusticus, *Brun.*

Syneches rusticus, Brunetti, Rec. Ind. Mus. ix, p. 20 (1913).

♂. *Head*: eyes with upper facets red, the lower smaller ones coffee-brown; three large ocelli, pale yellow and very distinct; antennæ blackish grey, 3rd joint and the rather thick arista paler; proboscis longer than head. *Thorax* black, only a little shining: some stiff hairs laterally and on posterior margin of scutellum;* viewed from a low angle at the sides, the anterior part of the mesonotum appears brown-dusted. *Abdomen* uniformly dark blackish brown, with yellowish-brown hairs laterally; genitalia concolorous, inconspicuous. *Legs* yellowish, pubescent; coxæ, major part of anterior femora, tips of all femora (very narrowly), and apical half of all tarsi, black; hind femora with a row of stiffer long hairs below. *Wings* distinctly brown, but not deeply so, highly iridescent; stigma ill-defined but distinct; halteres blackish brown.

Length, 3½ mm.

Described from one ♂ in the Indian Museum taken by me at Darjiling, 26. v. 1910.

259. Syneches palliditarsis, *Brun.* (Pl. IV, fig. 4.)

Syneches palliditarsis, Brunetti, Rec. Ind. Mus. ix, p. 18 (1913).

♀ *Head* black; the narrow face a little grey-dusted; eyes above antennæ absolutely contiguous, the upper facets reddish brown, the lower facets, which are much smaller, darker brown; proboscis shining brown, projecting considerably beyond head (in one specimen twice as long as head); palpi very short, nearly black; antennæ moderately light brown. *Thorax* shining black; when viewed from certain directions it appears distinctly dusted with brownish grey; the anterior part bare; some long soft hairs on posterior half and on scutellum, on the margin of which is a row of long stiff hairs. *Abdomen* black, a little shining, with brownish-yellow hairs, which are a little more plentiful than in the other Indian species of this genus. A peculiar feature in this species is the presence on the underside of the 5th segment of two parallel rows, placed longitudinally a short distance apart, of long soft golden yellow hairs. Genitalia elongate. *Legs* dark brown or blackish; tibiæ and tarsi mainly brownish yellow, but base of former and tips of latter darker; femora with rather copious long soft hairs; tibiæ with similar hairs, less regular and not so long, and with a row of longer stiffer hairs; first two joints of tarsi with two longer stiff hairs at their tips. *Wings* brownish grey, darker anteriorly; stigma brown, oval, moderately large; halteres dark brown.

Length, 5 mm.

Described from three ♀ ♀ in the Indian Museum taken at Sukna, 500 ft., base of Darjiling Hills (*Annandale*), 2. viii. 1908 (*type*) and 1. vii. 1908.

* Most of the bristly hairs are broken off, and therefore cannot be described with exactitude.

The palpi in *Syneches* are theoretically of a length approaching that of the proboscis, but in this species they are quite short, certainly not a fifth part as long as the proboscis. It should, perhaps, constitute the type of a new genus.

260. **Syneches fratellus,** *Brun.*

Syneches fratellus, Brunetti, Rec. Ind. Mus. ix, p. 18 (1913).

♀ Very like *S. palliditarsis*, Brun., but quite distinct. Eyes and antennæ wholly black. Abdomen without the two fringes of yellow hairs on venter, and the dorsal pubescence of the abdomen is more whitish than yellow. The legs have only the tarsi and extreme tips of the tibiæ yellow, the remaider being black. The wings are nearly clear. It is a much smaller species.

Length, 2½ mm.

One ♀ in the Indian Museum from Bhowali, Kumaon Distr., 5700 ft., 29. vi. 1910 (*A. D. Imms*).

261. **Syneches insignis,** *Brun.*

Syneches insignis, Brunetti, Rec. Ind. Mus. ix, p. 19 (1913).

♂ *Head* with occiput blackish grey; proboscis yellowish on apical half; eyes with upper facets much larger than lower ones; antennal 1st joint black (remainder missing). *Thorax* blackish grey, with microscopic brownish-grey pubescence and soft black hairs variously disposed; humeral calli black, shining, rather

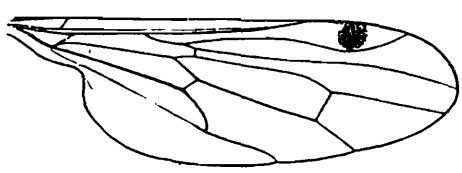

Fig. 25.—*Syneches insignis*, Brun., wing.

prominent, yet small; remainder of thorax, with scutellum and metanotum, blackish; the scutellum with at least two long bristly hairs. *Abdomen* blackish, with a slight deep blue tinge and sparse pale pubescence. *Legs* black, with a slight deep blue tinge; anterior knees, tips of anterior tibiæ, and all the tarsi wholly yellowish; the middle tibiæ brown. All the legs with soft black pubescence; hind femora considerably thickened, a row of small teeth and a row of isolated long stiff bristly hairs on underside. *Wings* grey; stigma very large, quite circular, dark brown, placed in the rather distinct curve downwards taken by the 2nd longitudinal vein.

Length, 2½ mm.

Described from one ♂ in the Indian Museum from Bhowali, Kumaon Distr., 5700 ft., 2. vii. 1910 (*A. D. Imms*).

262. Syneches fuscipennis, sp. nov.

♂ *Head* with upper eye-facets bright reddish brown, lower ones dark coffee-brown; vertex blackish; frons very small, dark, shining; face very narrow, dark grey; proboscis brownish yellow, barely reaching as far as tip of antennæ; palpi moderately long, brownish yellow; antennæ brownish yellow, 3rd joint brown, with a long bristle on upperside and very long dark arista which is yellowish at base; occiput blackish, very concave, with some long hairs on lower half. *Thorax* subglobular, dorsum hemispherical, dark brown, moderately shining, almost bare; scutellum concolorous, with a row of stiff hairs on hind margin. *Abdomen* dull black, with moderately long and soft black pubescence; genitalia concolorous. *Legs*: coxæ, anterior femora (except at tips), hind femora, and tarsi black; remainder of legs yellow. Pubescence rather long and moderately dense; a row of longer hairs on upper and outer sides of anterior tibiæ, and three long bristles on outer side of middle tibiæ; pubescence on underside of hind femora a little longer, and on hinder side of hind tibiæ towards tips conspicuously longer and denser; a row of 6–7 short blunt teeth below hind femora on apical half. *Wings* greyish brown; venation normal; halteres yellowish, with black clubs.

Length, about 3½ mm.

Described from a single ♂ in the Indian Museum from Talewadi, near Castle Rock, N. Kanara Distr., 3–10. x. 1916 (*Kemp*).

Genus **SYNDYAS**, *Lw.*

Syndyas, Loew, Öfv. K. Vet.-Akad. Förh. xiv, p. 369 (1857).

Genotype, *Syndyas opaca*, Lw. (S. Africa); by Coquillett's designation (1910).

The character in which this genus differs from *Hybos* is the indistinctness of that portion of the 4th longitudinal vein dividing the two basal cells. From *Syneches* it differs in the same way, and by the origin of the 2nd vein being more remote from the humeral cross-vein.

No specimen of the genus has come before me, only one Asiatic species having been recorded.

263. Syndyas parvicellulata, *Bezzi.*

Syndyas parvicellulata, Bezzi, Ann. Mus. Hung. ii, p. 321, fig. 1 (1904).

♀ *Head* round; eyes above antennæ contiguous, barely separated below by an extremely narrow shining black space; upper facets hardly larger than lower ones; proboscis short, horizontal; palpi black, slender, bare; ocellar bristles yellowish, very slender; antennæ wholly black, 3rd joint oval, acuminate, with rather long, very thin arista. *Thorax* moderately convex, very bright, with whitish hairs; dorso-central bristles very weak,

pale, only the posterior ones a little stronger. Scutellum with two bristles; halteres and squamæ black, fringed. *Abdomen* slender, acuminate, black, moderately shining, with a slight purplish tinge and pale hairs, which are somewhat longer on the venter; lamellæ of ovipositor prominent, blackish brown, with black hairs. *Legs*: middle pair shining black, with pale pubescence and short bristles; middle tibiæ on outer side with a row of five bristles of equal length; posterior tibiæ clavate at tip, with short bristles on outer side; tarsi with sparse, rather long bristles; posterior femora a little longer than tibiæ, hardly incrassate, with rather weak short bristles below. *Wings* clear, strongly iridescent, with weak pale veins; stigma absent; discal cell extremely small, placed in middle of wing.

Length, $2\frac{1}{2}$–3 mm.; wing, 2–2·5 mm.

Two females from Colombo, 28. ii. 1902, and one exactly similar from Sattelberg, Huon Gulf, Papua, v. 1899.

Very closely allied to *S. nitida*, Lw., from South Africa. Bezzi notes the difference in size of the discal cell as separating his from Loew's species. The form and relative positions of the bases of the 2nd and 3rd longitudinal veins are also different in he two species, according to the figures.

Genus **HARPAMERUS**, *Big.*

Harpamerus, Bigot, Rev. Mag. Zool. (2) xi, p. 301 (1859).

"Near *Hybos*. Head conical, short; proboscis erect, moderately long; palpi porrect, cylindrical, tip with long bristle. Antennæ short; two basal joints narrow and inconspicuous; 3rd rounded, as long as 1st, compressed; style long, bare, apical. Hind femora incrassate, underside with long spines incrassated at their bases. Wings with anal cell large, closed on hind margin of wing."

264. **Harpamerus signatus**, *Big.*

Harpamerus signatus, Bigot, Rev. Mag. Zool. (2) xi, p. 306 (1859).

"♂ ♀ Testaceous; abdomen brown at tip. Thorax brown, with three dark stripes. Proboscis pale; palpi brownish. Legs testaceous; hind legs brown; all tarsi pale testaceous or whitish, with black tips. Wings subhyaline, veins infuscated with brownish; stigma hemispherical, brown. Ceylon."

Length, 6 mm.

Genus **ACARTERUS**, *Lw.*

Acarterus, Loew, Öfv. K. Vet.-Akad. Förh. xv, p. 340 (1858); id., Dipt. Fauna Süd-Afr. p. 262 (1860).

GENOTYPE, *Acarterus unicolor*, Lw. (S. Africa).

Third antennal joint broad, shortly conical, with a straight bare

apical bristle. Proboscis porrect, horizontal; palpi linear. Legs simple; hind femora not incrassated or spined below. Wings with 2nd longitudinal vein originating from near base of 1st vein; basal cells subequal.

Range. Only three species were till recently known, from India (*pallipes*), Java, and South Africa, respectively.

The two Indian species may thus be separated:—

Larger species, 4·7 to 5 mm.; wings clear	*pallipes*, Bezzi.
Smaller species, 3 mm.; wings brownish	*fuscipennis*, Brun.

265. **Acarterus pallipes**, *Bezzi.*

Acarterus pallipes, Bezzi, Ann. Mus. Hung. ii, p. 335 (1904).

♂ ♀ *Head*: "Eyes large, flattened above, upper facets distinctly larger than lower ones; ocellar tubercle large, with two bristles; occipital margin with short fine hairs. Proboscis horizontal, moderately long, acuminate, shining yellow, darker at base; palpi rather small. Antennæ short, wholly clear yellow; 3rd joint rounded, somewhat acuminate in front, with a very fine long bristle above near base; arista nearly subapical, long, fine. *Thorax* moderately arched, hump-backed, black; humeral calli and from wing-base to scutellum dirty yellow, not shining; in certain lights a light reddish tomentum is visible; the somewhat long acrostichal bristles arranged in four rows; some long hairs posteriorly; scutellum with 10 to 12 dusky yellow bristles on hind margin; halteres large, with brown clubs; squamæ yellow, with a white fringe. *Abdomen* acuminate, velvet-black, quite opaque, with rather long pale hairs; male genitalia small, but of characteristic shape; the two lateral lamellæ forming a kind of forceps, with the branches bent inwards towards the tip. *Legs* all clear yellow, with the tarsi not darkened, not even at the tip, but only the claws black, and rather long and slender; hind femora not at all incrassate, without bristles or long hairs, bearing only short, fine pubescence. *Wings* clear, a little yellowish at base; stigma elongate, moderately pale, especially in ♀; veins pale yellow."

Length, 4·7–5 mm.; wings, 3·9–4 mm.

Two males and a female from Bombay, 18. vii. 1902.

Types in the Hungarian Museum.

266. **Acarterus fuscipennis**, *Brun.* (Pl. IV, fig. 5.)

Acarterus fuscipennis, Brunetti, Rec. Ind. Mus. ix, p. 21 (1913).

♂ *Head* with eyes wholly contiguous, the upper facets much larger than the lower ones, bright reddish brown; proboscis reddish yellow, as long as the height of the head; palpi brownish yellow, very small; antennæ brownish, with long arista; back of head blackish. *Thorax* dull black, highly arched, with a few hairs; a few lateral long stiff hairs, also some towards posterior

margin; sides similarly coloured or dark grey; scutellum with a fringe of long dark hairs. *Abdomen* black, scarcely pubescent; venter a little pale. *Legs* bright light brownish yellow, a little pubescent; coxæ and basal half of femora black; tarsi-tips blackish. Underside of hind femora and outer side of posterior tibiæ with a few long stiff hairs. *Wings* brownish, stigma darker brown; halteres large, black.

Length, 3 mm.

Described from two ♂ ♂ taken by Mr. E. E. Green at Peradeniya, Ceylon, vi. 1910 (*type* in Indian Museum), and v. 1911 (in Mr. Green's collection).

Genus **HYBOS**, *Mg.*

Hybos, Meigen, Illig. Mag. ii, p. 269 (1803).

GENOTYPE, *Musca grossipes*, L. (Europe).

Head small, subspherical; eyes occupying practically all the front side of the head, contiguous in both sexes from vertex to antennæ, upper facets (♂ ♀) larger than lower ones, demarcated by an impressed line; three ocelli on the extremely small, prominent vertex; epistome small, cheeks absent, the eyes extending downwards to oral opening. Proboscis not longer than height of

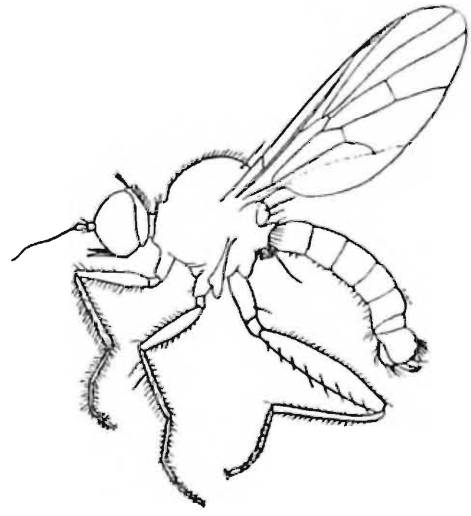

Fig. 26.—*Hybos apicis*, Brun.

head, directed horizontally forwards; palpi comparatively long, 1-jointed. Antennæ adjacent at base, inserted (seen in profile) at middle of head, 3-jointed; 1st and 2nd joints short, 1st more or less cylindrical, 2nd subglobular, with bristles; 3rd oval, longer than 2nd, with long arista, which may be pubescent on basal portion. *Thorax* rectangular, strongly arched or humped; dorsum with more or less distinct short stiff hairs arranged approximately in dorso-central and acrostichal rows; two notopleural (plus sometimes a third weaker one) and some postalar bristles; metapleura bare. Scutellum with two stronger and

some smaller marginal bristles. *Abdomen* subcylindrical, slightly curved, slightly pubescent, of eight segments, the eighth often more or less hidden, the 2nd longest dorsally; genitalia asymmetrical; ovipositor terminating in two small styliform lamellæ. *Legs* of moderate length, hind pair rather longer; hind femora slightly thickened and with rows of spines below; anterior tibiæ generally with apical spurs. Legs considerably pubescent, the male in some species with long characteristic hairs on anterior tibiæ and tarsi. Empodium small, narrow, ending in a long bristle. *Wings* well developed, comparatively broad; axillary lobe distinct; 3rd vein simple; upper branch of 4th vein simple; discal cell present; anal cell longer than 2nd basal cell, its posterior angle acute; anal vein weak, attaining margin of wing; stigma normally present.

Range. Europe, Asia, the Orient, Egypt, Natal, North and South America, Australia.

Life-history unknown.

The perfect insects inhabit low bushes and ground-plants in humid and shady situations.

Table of Species.

1.	Legs partly or wholly distinctly yellow or brownish yellow	2.
	Legs wholly black or dark brown; no definite yellow parts	5.
2.	Legs wholly pale yellow.	3.
	Legs not wholly yellow	4.
3.	Venter yellowish; scutellum black; a greyish depression laterally in front of scutellum	*bisetosus*, Bezzi, p. 338.
	Venter black; scutellum brownish yellow; no greyish depression	*tenuipes*, Brun.,* p. 338.
4.	Stigma absent; anterior tibiæ, hind knees broadly and all tarsi, yellow	*gagatinus*, Big., p. 339.
	Stigma present	5.
5.	Middle tibiæ, tips of middle femora, and most of middle tarsi yellow; length $3\frac{1}{2}$ mm.	*apicis*, Brun., p. 340.
	Fore tibiæ, tips of hind femora, and base of hind tibiæ yellow; length $2\frac{1}{2}$ mm.	*geniculatus*, Wulp, p. 340.
6.	Larger species, at least 5 mm. long	7.
	Smaller species, 2 to $3\frac{1}{2}$ mm. long . .	8.
7.	Thorax shining blackish, with two indistinct dorsal stripes; wings nearly clear; hind tarsi without golden-yellow pubescence below	*niger*, Brun., p. 340.
	Thorax blackish grey, unstriped; wings pale brownish grey; hind tarsi with conspicuous golden-yellow pubescence below.	*auripes*, Brun., p. 341.

* May be synonymous with *bisetosus*, Bezzi, the distinguishing characters being conceivably within the variation of a single species.

8.	Wings pale grey or clear; stigma indistinct or absent. ..	9.
	Wings distinctly brown, at least anteriorly and basally; stigma large and distinct .	*nitens*, Brun., p. 341.
9.	Palpi black	10.
	Palpi yellow	*flavipalpis*, Brun., p. 342.
10.	Legs black; length $3\frac{1}{2}$ mm.	*nigronitidus*, Brun., p. 342.
	Legs moderately dark brown; length $2\frac{1}{2}$ mm. .	*brunnipes*, Brun., p. 343.

267. **Hybos bisetosus**, *Bezzi.*

Hybos bisetosus, Bezzi, Ann. Mus. Hung. ii, p. 324 (1904).

"♂ ♀. A very distinct species, characterised especially by the slender, entirely pale legs.

"*Head* with eyes wholly contiguous in both sexes, upper facets larger than lower ones; proboscis horizontal, as long as palpi, dull yellow, more or less infuscated; occipital margin with a circlet of bristles; antennæ black or brown, 3rd joint elongate oval, thin, with moderately long arista. *Thorax* moderately convex, rather brilliant black; anterior margin, pleuræ, and the broad depression in front of the scutellum covered with grey tomentum; scutellum rounded, with grey tomentum. A long presutural bristle, two pairs of long dorso-central ones; two well-separated rows of short feeble acrostichal bristles, which are not easily visible; scutellum with two bristles. Squamæ and halteres yellow. *Abdomen* shining black, with yellowish venter and pale, moderately long pubescence, obtuse at tip in both sexes, but rather larger in the male, in which the genitalia are large and rounded. *Legs* rather slender, especially hind femora, which are elongate but hardly incrassate. All legs pale yellow, except tips of tarsi and the hind femora towards tips, which are somewhat darkened, especially on upper side. Pubescence whitish; fore tibiæ on anterior side near middle with a rather long bristle; middle pair with two very long and strong bristles at the middle, one on the outer and one on the inner side; middle tibiæ also with other shorter bristles at the middle and tip; hind pair quite incrassate at tip, and ciliated on outer side with short hairs; hind femora armed below with a row of seven or eight long strong black bristles. *Wings* narrow, hyaline, rather iridescent; stigma hardly distinguishable from a pale cloud.

"Nine males, eight females, Matheran, 800 metres, 8. vii. 02 (*Biro*)." (*Bezzi.*)

Types in the Hungarian Museum.

268. **Hybos tenuipes**, *Brun.* (Pl. IV, figs. 7, 8.)

Hybos tenuipes, Brunetti, Rec. Ind. Mus. ix, p. 13 (1913).

♂ *Head* black; upper eye-facets red, and much larger than the lower ones, which are black; antennæ black, arista four times

as long as 3rd joint, and distinctly pubescent for the basal two-thirds, the remainder quite bare. *Thorax* black, shining, sides and metanotum similar; scutellum broad, brownish yellow, the colour extending to the posterior angles of the thoracic dorsum. *Abdomen* dark brown, with pale pubescence; venter similar. *Legs* pale yellow. Fore tibiæ with a single long bristle in the middle; middle tibiæ with two such, one at one-third of its length on the outer side, the other just before the middle on the underside; hind femora with a row of five rather long bristles on apical fourth of underside, a long thin bristle in the middle, with two long stiff hairs placed equidistantly between this central bristle and the base; remainder of legs with short pubescence. *Wings* pale grey, inclining to yellowish on the costa; stigma indistinct; halteres yellow.

Length, 3 mm.

Described from a ♂ in the Indian Museum from Kurseong, 27. vi. 1910 (*Annandale*).

This is probably Bezzi's *bisetosus*, but I do not like to sink it definitely until further specimens of both species have been compared.

269. **Hybos gagatinus**, *Big.* (Pl. IV, fig. 6.)

Hybos gagatina, Bigot, Ann. Soc. Ent. France, (6) ix, p. 127 (1889).
Hybos gagatinus, Brunetti, Rec. Ind. Mus. ix, p. 15 (1913).

♂ *Head* with eyes reddish brown; proboscis blackish (broken off); antennæ blackish grey, with a very long arista;* occiput black. *Thorax* shining black; a pre-alar bristle, one or two on the pleuræ, and two nearly erect, widely separated, scutellar bristles; lower part of thorax dirty brownish grey (not bluish grey, as noted by me previously). *Abdomen* and venter blackish. *Legs* moderately dark shining brown; anterior tibiæ, the hind knees broadly, and all tarsi, light brownish yellow. Legs shortly but distinctly pubescent; middle tibiæ with two long bristles on upper half of outer side, two similar apical ones and also two rather long, but more slender ones on distal half of hinder side; all femora with a row of stiff long hairs below; hind femora with a row of well-separated long bristles below, also a row of stout, very short-socketed spines; front metatarsus with three long isolated stiff hairs, in addition to the rather dense, short, ordinary pubescence. *Wings* clear, very iridescent; 6th longitudinal vein rather faint; halteres yellowish.

Length, 4 mm.

Redescribed from the unique type in the Indian Museum from Margherita, Assam.

* In my note on this species (*vide l. c.*) it was erroneously stated that the antennæ were missing, as on closer inspection it is found that one of them is still wholly intact, though pressed close against the somewhat damaged head.

270. **Hybos apicis**, *Brun.*

Hybos apicis, Brunetti, Rec. Ind. Mus. ix, p. 12 (1913).

♂ *Head* black; proboscis and palpi light brown, shining; ocular orbits narrowly brown, underside of antennæ pale. *Thorax* wholly shining black; bristly hairs as in *nigronitidus*. *Abdomen* black, moderately shining; a few pale hairs at sides; genitalia shining black. *Legs* moderately dark brown, hind femora blackish brown; tips of middle femora, whole of middle tibiæ, and major part of middle tarsi pale yellowish brown; tips of hind femora

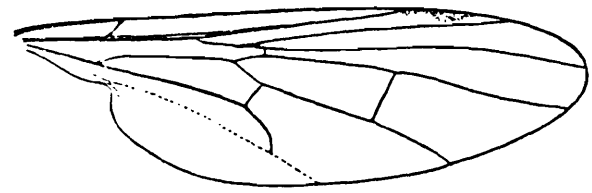

Fig. 27.—*Hybos apicis*, Brun., wing.

rather broadly, base of hind tibiæ less broadly, and hind tarsi wholly (except tips) pale yellowish brown. Bristly hairs as in *nigronitidus*. *Wings* nearly clear; stigma oval, brown; halteres brownish yellow.

Length, 3½ mm.

Described from one ♂ in the Indian Museum from the western base of the Dawna Hills, Lower Burma, 1. iii. 1908 (*Annandale*).

271. **Hybos geniculatus**, *Wulp.*

Hybos geniculata, Wulp, Termés. Füzet. xxii, p. 137 (1897).

"♂ Shining black; antennæ black, 3rd joint nearly elliptical, not longer than 2nd, arista longer than antennæ. *Thorax* especially shining. *Abdomen* with a slight purple tint. *Legs* black, with yellowish tarsi, darker at tips; fore tibiæ yellowish; tips of hind femora and base of hind tibiæ reddish yellow. Halteres whitish. *Wings* grey, with brownish stigma. One male, Kandy, March. Length 2½ mm." (*van der Wulp.*)

Type in the Hungarian National Museum.

272. **Hybos niger**, *Brun.*

Hybos niger, Brunetti, Rec. Ind. Mus. ix, p. 12 (1913).

♀ *Head* black; eyes with upper facets distinctly though not greatly larger than lower ones, both blackish brown, but with tinges of red in the former; occiput dark brownish grey, ocular orbit with a fringe of black, well-separated hairs, vertex with two long bristly hairs; antennæ, proboscis, and palpi all black, the latter as long as the proboscis. *Thorax* blackish, shining, tending to greyish towards the sides, anterior margin, and shoulders; two narrow well-separated inconspicuous grey dorsal stripes. Dorsum with soft short hairs, and, viewed from certain directions, with brownish tomentose reflections; some

longer bristly hairs in the usual situations. Scutellum concolorous, with two long bristles and some short stiff hairs; pleuræ and metanotum moderately dark grey. *Abdomen* blackish, with a moderate amount of pale pubescence, venter similar. *Legs* wholly black; anterior tibiæ with long stiff bristly hairs; hind femora with a row of small teeth below, each bearing a strong bristle. *Wings* nearly clear; stigma distinct but not sharply defined, brown, filling nearly the apical half of the marginal cell and extending to the costa; halteres bright yellow.

Length, 5½ mm.

Described from a single ♀ in the Indian Museum from Kurseong, 26. vi. 1910 (*Annandale*).

273. **Hybos auripes**, *Brun.*

Hybos auripes, Brunetti, Rec. Ind. Mus. ix, p. 14 (1913).

♂ ♀. *Head* black; proboscis not much longer than head, tipped with brownish yellow; palpi rather long, pubescent. *Thorax* blackish grey, when seen from certain directions, with a brownish-grey dust; sides dark grey. (Bristles on thorax broken off, but from those remaining apparently consistent with the arrangement in the other species herein described.) *Abdomen* blackish grey, with a brownish cinereous dust; a few pale hairs at the sides; genital organs in ♂ large, robust, conspicuous, consisting of an upper and lower thick cup-shaped piece, the former ending in two narrow blunted hairy points, the latter ending in two short obtuse bare points, the two pieces together enclosing a large ventral chamber in which are some smaller intermediate processes of a yellow colour, the whole of the genitalia, otherwise, being black, with stiff black hairs on the outside. In the ♀ the organs are small, pale, and inconspicuous. *Legs* black, pubescent; hind femora with a row of about twenty small teeth on underside, each bearing a short spine, in addition, a row of long stiff bristles; anterior tibiæ with at least two long bristles on inner and two on outer side of each; tarsi black, with pale hairs on underside, those on underside of hind pair golden yellow, and a little golden-yellow hair at the tips of the hind tibiæ on the underside. *Wings* pale brownish grey; stigma oval, brown, not very conspicuous; halteres yellow.

Length, 5 mm.

Described from a type ♂ from the Botanical Gardens, Darjiling, 12. viii. 1909 (*Paiva*), and a type ♀ from Kurseong, 7. ix. 1909 (*Annandale*), both specimens in the Indian Museum.

274. **Hybos nitens**, *Brun.*

Hybos nitens, Brunetti, Rec. Ind. Mus. ix, p. 13 (1913).

♀ This species has considerable general resemblance to both *brunnipes*, Brun., and *fuscipennis*, Brun. The head is dull black, including the very short proboscis, the palpi, and the antennæ. Body shining black, with soft, rather numerous pale hairs. Legs very dark brown, nearly black, with distinct though rather short

pale pubescence. Wings distinctly brown, paler on apical and posterior parts; stigma very distinct and large, dark brown; venation normal; halteres brown.

Length, 2 mm.

Described from one ♀ in the Pusa collection taken at Pusa, April 1908.

Type in the British Museum.

H. nitens is distinguished from *brunnipes* by the very brown wings and conspicuous large stigma, by the nearly black legs, and especially by the very shining black thorax and abdomen.

From *fuscipennis* it is separated by the shining black thorax and abdomen, the black proboscis, the very dark legs, and its smaller size, 2 mm. as compared with 3 mm.

275. **Hybos flavipalpis**, *Brun.*

Hybos flavipalpis, Brunetti, Rec. Ind. Mus. ix, p. 14 (1913).

♂ *Head*: eyes with upper facets much smaller than usual, but larger than lower ones; antennæ black; proboscis black, shining; palpi yellowish; occiput blackish, with a row of well-separated, curved, stiff black hairs, placed some distance behind the eye-margins; two bristles on vertex. *Thorax* shining black, stiff bristly hairs laterally towards posterior margins and two on the shining black scutellum. *Abdomen* black, moderately shining, with rather long and ragged, yellowish-grey hairs at the sides. Tip of abdomen enlarged; genitalia very large, black, shining, with some whitish soft hairs. *Legs* mainly black, but anterior tibiæ and tarsi more nearly dark brown; hind tibiæ distinctly brown towards tips, and slightly enlarged there; hind tarsi also distinctly brown. All the legs normally minutely pubescent, tibiæ with several long stiff bristly hairs on outer side; hind femora with two rows of small teeth below, bearing bristles. *Wings* pale grey; stigma present but weak, brownish; halteres yellow.

Length, 3 mm.

Described from one ♂ in the Indian Museum from Kurseong, 25. vi. 1910 (*Annandale*).

276. **Hybos nigronitidus**, *Brun.*

Hybos nigronitidus, Brunetti, Rec. Ind. Mus. ix, p. 11 (1913).

♂ ♀ *Head* black; occiput tinged with dark grey; proboscis almost as long as length of head, palpi nearly as long. *Thorax* shining black, beset with microscopic reddish hairs; sides of thorax a little greyish, but not at all conspicuously so. Two or three stiff bristly hairs about the base of the wing and one stiff hair on each humerus; a few of unequal length placed in a row on each side of the median line, and at least two of these (the two hindmost) of considerable size; two also at tip of the concolorous scutellum; both thorax and scutellum bear irregularly placed softer hairs. *Abdomen* shining black, in certain lights with a little greyish reflection; a little black pubescence in ♂; in ♀

the hairs brown and more numerous; genitalia shining black. *Legs* black, shortly pubescent; femora with a row of stiff hairs below, most conspicuous on hind pair; tibiæ with some stiff hairs, including two at tip; knees narrowly brown; underside of tarsi with pale hairs. *Wings* pale grey, highly iridescent; venation normal; stigma small, pale brown, sometimes hardly perceptible; halteres yellow.

Length, $3\frac{1}{4}$ mm.

Described from one ♂ and three ♀ ♀ in the Indian Museum: type ♂ from Sukna, 500 ft., 1. vii. 1908 (*Annandale*); type ♀ from Darjiling, 29. v. 1910 (*Brunetti*); two additional ♀ ♀ from Kurseong, 7–8. vii. 1908; Darjiling, 7000 ft., 8. viii. 1909 (*Jenkins*).

277. **Hybos brunnipes**, *Brun.*

Hybos brunnipes, Brunetti, Rec. Ind. Mus. ix, p. 12 (1913).

♂ *Head* blackish; antennæ wholly dark brown. *Thorax* black, moderately shining; viewed in certain lights it appears dusted with light grey; two bristly hairs on hind margin of scutellum (those on the thorax are mostly broken off). *Abdomen* brownish black, with pale hairs; genitalia small. *Legs* moderately dark brown; hind femora with soft grey pubescence; bristly hairs as in the two preceding species. *Wings* clear, iridescent; no stigma; halteres yellow.

Length, $2\frac{1}{2}$ mm.

Described from one ♂ in the Indian Museum from Kurseong, 8. viii. 1908.

Genus **PARAHYBOS**, *Kert.*

Parahybos, Kertész, Termés. Füzet. xxii, p. 176 (1899).

GENOTYPE, *Parahybos iridipennis*, Kert. (Papua).

This genus differs from *Hybos* only by the subapical arista, the less humped thorax, and the unthickened hind femora. It is also closely allied to *Acarterus*, Lw., although this latter technically falls into a different section of the subfamily.

Only one species is Indian, but Bezzi has described several from Formosa.

Range. India, Java, Formosa, Papua.

278. **Parahybos flavipes**, *Brun.*

Parahybos flavipes, Brunetti, Rec. Ind. Mus. ix, p. 21 (1913).

♂ *Head* with eyes above reddish, closely contiguous, the lower facets coffee-brown and much smaller; antennæ yellowish, arista very long, 2nd joint bristly, 3rd with a single bristle above; face deeply sunk, greyish. *Thorax* wholly dull black, with some soft hairs towards posterior margin and on scutellum, which latter (with the metanotum) is concolorous. *Abdomen* wholly dull, very dark blackish brown, with pale pubescence. *Legs* rather bright brownish yellow, except coxæ and basal half of femora; traces of

black at tips of femora and tarsi; soft yellow pubescence on legs, no conspicuous bristly hairs. *Wings* pale grey; stigma indistinct, brown; halteres black.

Length, 3 mm.

Described from a single ♂ in the Indian Museum from Sukna, base of Darjiling Hills, 1. vii. 1908 (*Annandale*).

An immature specimen, probably a ♀, from near Bhowali, Kumaon, Western Himalayas, taken by Dr. A. D. Imms, 13. vi. 1910, is apparently this species.

Subfamily EMPINÆ.

Eyes normally contiguous or subcontiguous in male, well separated in female; in some species narrowly but distinctly separated in both sexes; the frons in the male in such cases sometimes, but not always narrower than in the female. Proboscis varying from a little shorter than height of head to longer than whole body; palpi 1-jointed. Antennæ 3-jointed, with two-jointed style.

Thorax of moderate height; metapleura with bristles, except in *Hilara*.*

Axillary lobe of wing well developed, except occasionally; 3rd longitudinal vein simple or forked, 4th vein forked; lower branch of 5th longitudinal vein recurrent, approximately parallel with hind margin of wing, meeting anal vein at an obtuse angle, making anterior margin of anal cell the longer; anal vein of varying length. Four posterior cells; a discal cell; basal cells subequal; anal cell shorter than 2nd basal; squamæ small or absent.

Members of this subfamily may be recognised by the elongated, downwardly directed proboscis in conjunction with the lower branch of the 5th longitudinal vein being parallel to the hind margin of the wing. It includes the largest species of the family (*Empis* and *Rhamphomyia*, but both genera include also very small species).

Table of Genera.

Third longitudinal vein not forked	RHAMPHOMYIA, Mg., [p. 345.
Third longitudinal vein forked.	
Auxiliary vein not reaching wing-border; upper branch of 3rd vein forming a wider angle with lower branch, often nearly at right angles to it; fore tarsi in male not dilated (or at most only very slightly swollen); metapleura with bristles	EMPIS, L., p. 347.
Auxiliary vein reaching wing-margin; upper branch of 3rd vein forming a smaller angle with lower branch, sometimes almost parallel with it; fore tarsi in male distinctly dilated;† metapleura bare.	HILARA, Mg., p. 357.

Howlettia, Brun., is not included in the table of genera, being anomalous, but is retained temporarily in this subfamily.

* This exception only refers to the Oriental genera.

† Rare exceptions occur.

Genus **RHAMPHOMYIA**, *Mg.*

Macrostomus, Wiedemann, Zool. Mag. i, p. 59 (1817).
Rhamphomyia, Meigen, Syst. Besch. iii, p. 32 (1822).
Enicopteryx, Stephens, Syst. Cat. Brit. Ins. ii, p. 264 (1829).
Rhamphomyza, Zetterstedt, Ins. Lapp. p. 562 (1838).
Holoclera, Schiner, Wien. Ent. Monats. iv, p. 53 (1860).

GENOTYPE, *Empis sulcata*, Mg. (Europe); by Curtis's designation.

This genus differs from *Empis* mainly in the 3rd longitudinal vein being simple. The eyes are proportionately rather larger, and, in the case of contiguous eyes, the larger and smaller facets are more sharply demarcated. The legs, equally as in *Empis*, show specific diversity in adornment. Wings sometimes considerably dilated; 3rd vein simple; discal cell sometimes very large and extended nearly to wing-margin.

Range. World-wide.

Life-history. Beling has described the early stages of some European species. The larva is carnivorous, and hibernates, changing to the pupa in the following spring or autumn. *Rhamphomyia* is generally distributed in the same localities frequented by *Empis*, some species hovering in the air or just above water.

It is mainly a temperate zone genus, the Palæarctic and North American species being very numerous.

Attempts have been made to arrange the species into definite groups, but without much success.

Table of Species.

Thorax bright brownish yellow; an oval black spot on anterior part	*unifasciata*, Brun., p. 345.
Thorax grey.	
Hind femora with short thick hairs above and dark brown scales below.	*himalayana*, Brun., p. 346.
Hind femora apparently with only microscopic pubescence	*griseonigra*, Brun., p. 346.

279. **Rhamphomyia unifasciata**, *Brun.*

Rhamphomyia unifasciata, Brunetti, Rec. Ind. Mus. ix, p. 29 (1913).

♂ *Head* placed on a neck of moderate length, blackish. The 1st and 2nd antennal joints rounded, a little broader at the tips, 3rd as long as 1st and 2nd together, elongate-oval; arista placed at the extreme tip of the dorsal side. *Thorax* bright brownish yellow; an oval black spot on anterior part of dorsum, drawn out to a point on anterior margin; sometimes not narrowed in front but diminished in intensity, and in some cases extended posteriorly towards the hind margin; traces of two narrow lines from the hinder corners of the spot towards posterior margin,

and a trace of a small blackish spot between these lines; scutellum concolorous, rather wide, a little blackish at the base. *Abdomen* shining, dark blackish brown; venter more or less yellowish; genitalia withdrawn. *Legs* brownish yellow; tibiæ and tarsi barely darker. *Wings* very pale grey, nearly clear; stigma present, but indistinct; halteres brownish yellow.

Length, 3 mm.

Described from two ♂ ♂ in the Indian Museum from Mundali, Jaunsar division, Dehra Dun, 9000 ft., 12. v. 1910 (*type*) (*C. W. Beebe*), and Simla, 12. v. 1908 (*Annandale*).

280. **Rhamphomyia himalayana**, *Brun.*

Rhamphomyia himalayana, Brunetti, Rec. Ind. Mus. ix, p. 28 (1913).

♀ *Head* black; occiput moderately dark grey, with black hairs; frons wide, dark grey; three distinct ocelli on vertex, with a pair of divaricate bristles between the two upper ones; antennæ black; proboscis blackish, about as long as the head. *Thorax* moderately dark ash-grey, with two median very narrow whitish lines from the anterior margin; dorsum with short blackish pubescence; sides, scutellum, and metanotum concolorous. *Abdomen* dark grey, with short blackish pubescence; venter similar. Genitalia very elongate, terminating in two unusually finger-like lamellæ. *Legs* dark brown, with blackish pubescence; femora and tibæ with a row of stiff hairs; hind femora with thick short black hairs above and dark brown scales on lower side; hind tibiæ with thickly and more bristly black hairs. *Wings* pale brownish grey; stigma absent; halteres yellow.

Length, 3 mm.

Described from a single ♀ in the Indian Museum from Matiana, Simla Distr., 8000 ft., 28-30. iv. 1907 (*Annandale*).

281. **Rhamphomyia griseonigra**, *Brun.*

Rhamphomyia griseonigra, Brunetti, Rec. Ind. Mus. ix, p. 29 (1913).

♂ *Head* with eyes dark reddish brown, upper facets much the larger; occiput grey, with stiff black hairs; antennæ blackish, 3rd joint elongate, with distinct elongate style; face dark grey; proboscis blackish, shining, brownish towards tip. *Thorax* dark cinereous grey, lighter grey on shoulders and pleuræ; the centre of the dorsum has a slight brown tinge, with two indistinct longitudinal narrow black stripes. The whole dorsum with short black stiff hairs irregularly situated and some longer bristly hairs in the neighbourhood of the wings; scutellum concolorous, with black hairs on posterior margin, but apparently no very strong ones; metanotum dark grey. *Abdomen* all blackish grey, with very short black hairs. *Legs* black, shortly black pubescent; tibiæ with

a few stiff black hairs; hind femora apparently with only microscopic pubescence; hind tibiæ with soft black hairs on outer side, becoming longer towards the tips, where these tibiæ themselves are gradually thickened; hind metatarsi lengthened and enlarged.

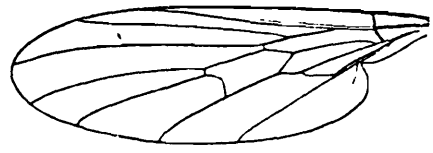

Fig. 28.—*Rhamphomyia griseonigra*, Brun., wing.

Wings pale brown, stigma an indistinct darker brown streak; halteres dirty brownish yellow.

Length, 4 mm.

Described from a single ♂ from Mundali, 9000 ft., Dehra Dun, 12. v. 1910, in the Indian Museum.

Genus **EMPIS**, *L.*

Empis, Linnæus, Syst. Nat. 10th ed. p. 603 (1758).
Platyptera, Meigen, Illig. Mag. ii, p. 269 (1803).
Pachymeria, Stephens, Syst. Cat. Brit. Ins. ii, p. 262 (1829).
Platypterygia, Stephens, *loc. cit.* p. 263.
Pachymerina, Macquart, Hist. Nat. Dipt. i, p. 333 (1834).
Eriogaster, Macquart, Dipt. Exot. i, pt. 2, p. 162 (1839).
Enoplempis, Bigot, Bull. Soc. Ent. France, (5) x, p. 47 (1880).

GENOTYPE, *Empis pennipes*, L. (Europe); by Latreille's designation.

Head globular, sometimes elongated or pear-shaped, the occiput in the latter case subconical; some bristles and pubescence occur; eyes normally contiguous in male, sometimes narrowly separated; always more or less distinctly separated in female; in contiguous eyes, upper facets larger than lower ones, not distinctly demarcated; ocellar tubercle prominent. Proboscis from as long as height of head to as long as whole length of body, prominent, straight, directed downwards; palpi 1-jointed, slightly curved. Antennæ 3-jointed, with a distinct 2-jointed style; 1st joint longer or shorter; 2nd short, both more or less bristly; 3rd always the longest, conically tapering, bare; first joint of style always very short, style always bare. *Thorax* approximately rectangular, moderately arched, prothorax distinct. Some weak dorso-central and sometimes acrostichal bristles present, with distinct but not strongly-developed bristles on margin of thorax, generally humeral, post-humeral, notopleural, supra-alar, and postalar. Scutellum with two or more marginal bristles. *Abdomen* cylindrical in male, broader at base and more tapering posteriorly in female; 8-segmented, the last sometimes hidden. Genitalia in male well developed, consisting of at least two pairs of appendages; in

female, in which sex the last three abdominal segments are sometimes suddenly contracted, terminating in the usual pair of styliform lamellæ. *Legs* comparatively slender, rather long, the femora occasionally thickened, and more rarely the front or hind metatarsi, or both pairs, more or less dilated; tibiæ sometimes with apical spurs. The ornamentation of the legs variable, some species having fan-like rows of scales or scale-like hairs on the femora or tibiæ, and sometimes on the metatarsi also; bristles and long hairs of specific value often present; all the legs ordinarily with short pubescence. *Wings*: auxiliary vein not reaching margin; 1st and 2nd longitudinal veins long, 3rd forked towards tip; upper branch of 4th vein forked at corner of discal cell; lower branch of 5th vein strongly recurrent, approximately parallel with hind margin of wing, meeting anal vein at a widely obtuse angle and making anterior margin of anal cell much longer than posterior one; anal cell much shorter than 2nd basal; anal vein attaining wing-margin; discal cell present. Axillary lobe of wing well developed; squamæ small. The shade of the wing is often darker in one sex—in some males almost milky.

Range. World-wide.

Life-history. Little definitely known. The larvæ live in moist earth in woods, or less frequently in rotting tree-trunks. They are amphipneustic, of twelve segments, and of the usual maggot form. They are said to hibernate.

The species of *Empis* are generally distributed, but prefer shaded and somewhat moist situations. Many species occur at times in vast numbers; some hover in the air. Presumably all are carnivorous, preying on soft Diptera and small moths. The mating of some species takes place in the air, and affords a most interesting study;* others on the surface of water; whilst in other species the curious fact seems established that the male catches some prey and presents it to the female, which devours it during copulation. In one American species a small balloon of minute bubbles is formed, in which a small dead fly, presumably prey, is enclosed, the balloon being discarded after copulation.

Table of Species.

1.	Front tarsi in ♂ extraordinarily developed, as long as remainder of front legs; ♀ unknown	*amplitarsis*, sp. n., [p. 349.
	First tarsi in ♂ not extraordinarily developed, nor as long as remainder of front legs.	2.
2.	Halteres chalk-white ..	*albohalteralis*, sp. n., [p. 350.
	Halteres not chalk-white	3.
3.	Upper branch of 4th vein abbreviated ..	4.
	Upper branch of 4th vein reaching wing-margin	6.

* See Howlett, Ent. Month. Mag. xliii, p. 229; Lundbeck, Dipt. Danica pt. 3, p. 83; Aldrich, Amer. Natur. xxxiii, p. 809; Hamm, Ent. Month. Mag (2) xix, p. 181, and (2) xx, pp. 132, 157.

4. Femora and tibiæ pennate	*squamata*, Brun., *	
Femora and tibiæ not pennate	5.	[p. 352.
5. Auxiliary vein and 1st longitudinal veins united	*ceylonica*, Bezzi,	[p. 352.
Auxiliary and 1st longitudinal veins separate.	*carbonaria*, Brun.,	[p. 351.
6. Anterior cross-vein between $\frac{1}{3}$ and middle of discal cell.	7.	
Anterior cross-vein distinctly before $\frac{1}{3}$ of discal cell	11.	
7. Posterior femora and tibiæ pennate	8.	
Posterior femora and tibiæ not pennate	10.	
8. Hind tibiæ shortly pennate on basal half only, in front and behind; proboscis $1\frac{1}{2}$ times height of head, not reaching base of abdomen; anterior cross-vein at middle of discal cell.	*centralis*, † Brun.,	[p. 353.
Hind tibiæ with a long fringe for practically their whole length, in front and behind	9.	
9. Hind metatarsus pennate; proboscis more than twice height of head, reaching beyond base of abdomen; anterior cross-vein between $\frac{1}{3}$ and middle of discal cell.	*rostrata*, Brun.,	[p. 355.
Hind metatarsus not pennate; proboscis $1\frac{1}{2}$ times height of head, not reaching base of abdomen; anterior cross-vein just before middle of discal cell	*subcilipes*, Brun.,	[p. 354.
10. Dorsum of thorax with three black stripes; legs dark brown; anterior cross-vein at $\frac{2}{5}$ of discal cell; abdomen uniformly grey	*griseonigra*, Brun.,	[p. 353.
Dorsum of thorax with four black stripes; legs bright orange: anterior cross-vein just before middle of discal cell; hind margins of 2nd, 3rd, and 4th abdominal segments black. . .	*marginata*, Brun.,	[p. 356.
11. Legs pale yellow	*elegans*, Brun, p. 356.	
Legs dark brown	*inconspicua*, Brun.,	[p. 357.

282. **Empis amplitarsis**, sp. nov.

♂ *Head* with vertex moderately large, blackish; two long ocellar bristles and some smaller ones; upper eye-facets bright brown, smaller lower ones coffee-brown; antennæ black, 3rd joint as long as 1st and 2nd together, subconical, with elongated tip and long style; proboscis brownish yellow, about twice as long as vertical height of head; palpi rather small, upturned, yellowish; occiput dark grey, with the usual bristles. *Thorax* moderately shining blackish, with grey-dusted reflections in certain lights. *Abdomen* moderately shining dark brown, with short sparse pubescence, which is longer at the sides. *Legs* uniformly moderately dark brown, except the extraordinarily developed front tarsi, which are a little darker; these latter are fully as long as the rest of the front leg from base of coxa to tip of tibia; 1st joint

* May be the ♀ of *carbonaria*, Brun.
† May be the ♀ of *griseonigra*, Brun.

nearly as long as tibia, flattened, broad at tip; 2nd joint rather more than half as long as first, narrower, cylindrical, thickened; 3rd joint nearly as long as 1st, much incrassated, broader and much longer than 2nd and broader at tip than at base; 4th joint about as long as 3rd, narrower, thin, considerably arched, so that the underside forms a large cavity; 5th joint shorter than 4th, moderately incrassated, bluntly conical; claws and pulvilli normal. Pubescence on coxæ and femora moderately long and dense, a little thicker on hind femora, with a few longer hairs on outer side; front tibiæ with a row of short hairs on inner side, a row of longer ones on outer side, and a row of very long ones on upper side; middle tibiæ moderately pubescent, with two long bristles on outer side (one at middle, one preapical); hind tibiæ covered with rather dense, moderately long pubescence and longer hairs, and with a row of quite long hairs on hinder side; anterior tarsi with 1st joint nearly bare except for a few hairs towards tip, remaining joints

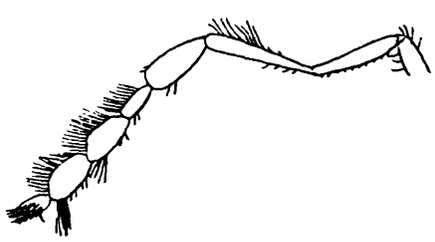

Fig. 29.—*Empis amplitarsis*, sp. nov., front leg of male.

with long dense hairs on upper and outer sides, a few short hairs on inner and lower sides, the 4th also bearing a denser bunch on upper side near tip. *Wings* pale grey; venation approximately normal, anterior cross-vein at $\frac{1}{4}$ discal cell; halteres moderately dark brown.

Described from a single ♂ from the Pusa collection from Belgaum, Bombay Presidency, 2500 ft., 11. viii. 1910 (*Fletcher*), presented to the British Museum.

A label attached by Mr. T. Bainbrigge Fletcher says: "Fore-legs are stretched out in front and function as antennæ; they are not used for locomotion." The extraordinary development of the front tarsi easily distinguishes this species from all other Indian EMPIDÆ, yet this character is the only one in which it differs from typical species of *Empis*.

283. **Empis albohalteralis**, sp. nov.

♂. *Head* with vertex blackish, frons and face moderately dark grey; first two antennal joints yellowish, 3rd black, base narrowly pale, style rather long; proboscis black, reaching (bent under body) to middle of abdomen; palpi pale yellowish, curved upwards, rather long, with a few black bristles; eyes with large upper facets bright brown, lower small ones coffee-brown; occiput ash-grey, a marginal row of small black bristles and a more central

row of stronger ones. *Thorax* shining black, closely and entirely covered with cinereous dust, in which three narrow slightly yellowish stripes of the usual nature can be faintly traced; scutellum and metanotum with dark grey dust; sides of thorax concolorous with dorsum; metapleural hairs yellow. *Abdomen* blackish, rather shining, with sparse pubescence; hind margin of segments indistinctly pale; venter yellowish; genitalia shining yellowish brown. *Legs*: coxæ dull orange, more or less grey-dusted on basal part, a little pale pubescence in front; remainder of legs orange, hind tibiæ more brownish towards tips; anterior tarsi blackish brown towards tips, hind metatarsi much enlarged and lengthened, remaining hind tarsal joints black. *Wings* pale grey, venation normal; anterior cross-vein just before middle of discal cell; halteres conspicuously chalk-white.

Length, 5 mm.

Described from one ♂ in the Indian Museum from Zairat, Baluchistan, 8000–9000 ft., viii. 1914 (*Major Wilson*).

Easily recognised from all other species by the conspicuous white halteres.

284. Empis carbonaria, *Brun.*

Empis carbonaria, Brunetti, Rec. Ind. Mus. ix, p. 27 (1913).

♂. Wholly and uniformly coal-black, moderately shining. Eyes separated by a narrow frons. Antennal 3rd joint distinctly longer than the first two together, and its distal half rather suddenly narrow; style thick, half as long as the joint. Proboscis nearly twice the height of the head, labium bifid at the tip.

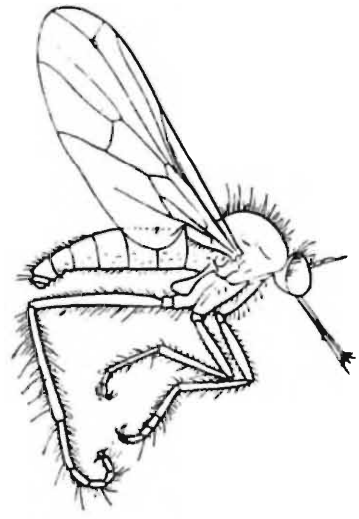

Fig. 30.—*Empis carbonaria*, Brun.

Head, thorax, and abdomen covered with long, soft, but not copious pubescence. Legs dark brown, with rather long soft black hairs; fore femora almost bare; fore metatarsus distinctly incrassated, cylindrical, lengthened, as long as remaining tarsal joints together; hind metatarsus as long as next three joints together,

slightly thickened; posterior tibiæ and tarsi with a row of well-separated long bristly hairs. Genitalia small, rounded, not conspicuous. Wings clear; antennal cross-vein at one-fourth of the discal cell; 4th vein shortened; stigma slightly brownish, small; halteres black.

Length, 4 mm.

Described from two ♂ ♂ in the Indian Museum and one in Mr. E. E. Green's collection from Horton Plains, Ceylon, v. 1911 (*Green*).

Type in the Indian Museum.

285. **Empis squamata**, *Brun.* (Pl. IV, fig. 11.)

Empis squamata, Brunetti, Rec. Ind. Mus. ix, p. 27 (1913).

♀ Wholly coal-black. Proboscis three times as long as the head. Antennæ normal. Thorax with soft black hairs. Abdomen nearly bare, roughened, shining; venter similar; ovipositor small, elongate, normal. Legs with a dense row of long, closely placed, dark brown scales on underside of fore femora, on upper- and undersides of posterior femora, front and hind sides of fore and hind tibiæ, outer and inner sides of middle tibiæ, and on upper sides of all metatarsi; a single long bristly hair on outer and inner sides, projecting somewhat backwards towards tips of all tibiæ and of first four tarsal joints, these hairs very much longer on hind legs; the unscaled parts of the legs bear a little black pubescence. Wings pale brown; 4th vein abbreviated; stigma black; halteres black.

Length, $2\frac{1}{2}$–3 mm.

Described from several ♀ ♀ collected by Mr. E. E. Green on the Horton Plains, Ceylon, May 1911.

Type and other specimens in the Indian Museum.

Probably the ♀ of *carbonaria*, having been taken so often by Mr. Green in company with that species. However, it must be distinct from *ceylonica*, Bezzi, with which at first I thought it might be synonymous, as that species has no conspicuous brown scales on the legs, and has the auxiliary and 1st longitudinal veins anastomosed. *E. squamata* has a considerable resemblance to *jacobsoni*, Meij., described from Java, but in the latter species the upper side of the front femora bears long brown scales like the posterior pairs.

286. **Empis ceylonica**, *Bezzi.*

Empis ceylonica, Bezzi, Ann. Mus. Hung. ii, p. 343 (1904).

♀ A shining black species, distinguished by the broadened brownish wings, with basal third hyaline; pubescence black, but below the setæ the body is bare; proboscis black, as long as head and thorax together; frons shining black, bare, head-bristles rather long. Antennæ short, black, shortly pubescent at base; 3rd joint with upper edge straight and excised below, ending in a

rather long style. *Thorax* shining black and bare, with the pleuræ greyish: 2–3 long black metapleural bristles and two moderately long presutural ones; squamæ yellowish, with black fringe. *Abdomen* brilliantly shining black, with a few black hairs; venter with longer hairs on margins of segments; ovipositor long, slender, with elongate lamellæ. *Wings* broadened, axillary angle developed; 1st longitudinal vein rather long, united to auxiliary vein; 3rd vein bent downwards somewhat towards tip so that it ends at tip of wing, its upper branch nearly perpendicular; discal cell large, apical end truncate; 4th vein rather long, ending at some distance from the margin; 6th vein shortened. *Legs* brown, rather long, especially hind pair, pubescent and with bristles; middle tibiæ with two long bristles above; hind tibiæ with 6 or 7 long ones in two rows; hind metatarsus very elongate, as long as remaining joints together, with three or four long bristles above; remaining joints with a single bristle at tip of each.

Length, 3 mm.; wing, 4 mm.

A unique female from Pattipola, Ceylon, 2000 metres, 22. ii. 1902.

Type in the Hungarian Museum.

287. **Empis griseonigra**, *Brun.*

Empis griseonigra, Brunetti, Rec. Ind. Mus. ix, p. 29 (1913).

♂ *Head* with occiput blackish; eyes absolutely contiguous above antennæ; face dark grey; antennæ black; palpi black; proboscis one-fourth longer than the height of the head, dark brownish yellow, black on underside. *Thorax* brownish grey, with three moderately wide brown dorsal stripes, the median one attaining the anterior margin, the outer ones only extending as far as the shoulders. Some short bristly hairs on shoulders, soft black pubescence over the dorsum generally, and stiffer hairs and bristles distributed as in the other species. Sides of thorax a little darker grey, pleuræ light grey. *Abdomen* blackish, with short sparse black pubescence; whitish pubescence at sides of the first two segments; genitalia blackish. *Legs* dark brown, with black pubescence; knees reddish brown, with a trace of this colour over some of the other joints. *Wings* pale grey; stigma imperceptible; anterior cross-vein at about two-fifths discal cell; halteres bright yellow.

Length, 5 mm.

Described from one ♂ in the Indian Museum from Mundali, Jaunsar division, Dehra Dun, 9000 ft., 12. v. 1910 (*A. D. Imms*).

288. **Empis centralis**, *Brun.*

Empis centralis, Brunetti, Rec. Ind. Mus. ix, p. 26 (1913).

♀ *Head*: occiput black, with black hairs above, and some white hairs below; frons and face proportioned as in *E. rostrata*

but blackish, as are also the antennæ, but the face, viewed from below, shows dark grey reflections; palpi bright brownish yellow; proboscis one and a half times the height of the head, the upper side brownish yellow. *Thorax* light brownish grey, with soft black pubescence, and bristly hairs laterally and towards the hind margin; two narrow median well-separated brown stripes from anterior margin extending three-fourths of the distance to the scutellum; a lateral broader stripe on each side, practically formed of three irregularly-shaped elongate spots (one on the shoulder, one in front of and one behind the pre-sutural depression), which are contiguous, the hind one attaining the posterior margin of the dorsum. Some bristles laterally and towards hind margin of mesonotum, also four on the scutellum. Sides of thorax and metanotum light grey, dorsum of scutellum brownish grey. *Abdomen* darker grey, with short sparse black hairs; posterior margins of segments more or less black; genitalia elongate, concolorous, much as in *E. rostrata*; venter dark grey. *Legs*: coxæ dark grey, remainder of legs brownish yellow, extreme tips of femora blackish, and tips of tarsal joints more broadly blackish. All the legs with black pubescence; posterior femora with blackish bristly hair above; hind femora with scales; posterior tibiæ with blackish-brown scales on front and hind sides, as in *E. rostrata*, but much less strong and apparently confined to the basal half of the hind pair; on the hind side of the hind tibiæ a row of moderately long, well-separated bristles. *Wings* very pale grey, nearly clear; anterior cross-vein directly over the middle of the discal cell; halteres bright brownish yellow.

Length, 5 mm.

Described from one ♀ in the Indian Museum from Mundali, Jaunsar division, Dehra Dun, 12. v. 1910.

It seems likely that this will prove to be the female of *E. griseonigra*.

289. **Empis subcilipes,** *Brun.*

Empis subcilipes, Brunetti, Rec. Ind. Mus. ix, p. 24 (1913).

♀ *Head* ash-grey; frons about one-fourth the width of the head; some short stiff black hairs behind the eyes, and some soft white hairs on lower part of occiput; antennæ reddish brown, rather long, black-streaked on upper side and with a whitish shimmer on the inner side in certain lights; antennal style of moderate length; proboscis nearly three times the height of the head, reddish brown, with the underside black. *Thorax* moderately dark ash-grey; a broad brownish-grey median stripe from the anterior margin and a less distinct much shorter stripe on each side, not extending to the shoulders. Surface of dorsum with short setæ more or less irregularly placed, but a distinct double row in the centre and a number towards each shoulder; some stiff bristles above and in front of each wing and four on

posterior margin of scutellum, which latter with the metanotum are both light mouse-grey; sides dark grey. *Abdomen* rather dark grey; 1st segment with a little black and grey pubescence; remainder of segments with scattered, very short pale hairs; venter tawny; genitalia very dark brown. *Legs* brownish yellow, coxæ a little bluish grey on basal half; femora more or less blackish in middle and on upper side generally; tarsi mainly black. Upper and lower sides of four posterior femora with thick but short black ciliated hairs; rest of legs finely black pubescent. *Wings* pale grey, veins brownish yellow on basal part, blackish distally. Anterior cross-vein just before middle of discal cell; stigma imperceptible; halteres brownish yellow.

Length, 5½ mm.

Described from a single ♀ in the Indian Museum from Mundali, Jaunsar division, Dehra Dun Distr., 9000 ft., 12. v. 1910.

290. **Empis rostrata**, *Brun.* (Pl. IV, figs. 9, 10.)

Empis rostrata, Brunetti, Rec. Ind. Mus. ix, p. 25 (1913).

♀ *Head* with occiput grey, with a few bristly black hairs above; frons and face concolorous grey, the former comparatively wide, with parallel edges, the latter much wider; antennæ black, 2nd joint very distinctly bright brownish yellow; palpi bright brownish yellow, short; proboscis two and three quarter times height of head; reaching beyond base of abdomen, brownish yellow, a little blackish in middle on underside; a few whitish hairs on underside of head. *Thorax*: dorsum (somewhat discoloured in the centre) light brownish grey, with a narrow median darker brown stripe and a wider one on each side not quite extended to anterior margin of thorax; and laterally two brownish spots, one in front

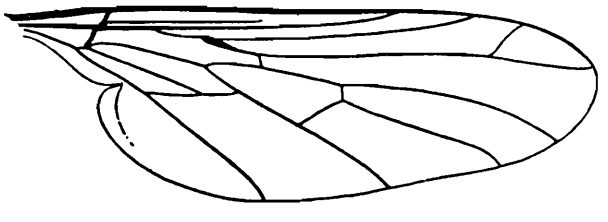

Fig. 31.—*Empis rostrata*, Brun., wing.

of and one behind the presutural depression; sides, scutellum, and metanotum concolorous, or a little more nearly ash-grey. (Thorax denuded of bristles.) *Abdomen* light grey, brownish at base of each segment, the colour broader in the centre; genitalia slender, cylindrical, terminated by two thin finger-like lamellæ, concolorous; venter light grey, unmarked. *Legs* between light brown and tawny; coxæ a little grey-dusted and with a little soft whitish hairs; tarsi more or less blackish on upper side; extreme tips of femora very narrowly black; posterior femora with blackish-brown scales above and below; posterior tibiæ with blackish-brown scales, much thicker and larger on hind pair, on which they occur

below the metatarsi also, and are even continued in a less pronounced scale-like form on the underside of the remaining tarsal joints; the legs generally with minute stiff black hairs. *Wings* brownish yellow; anterior cross-vein at two-fifths of discal cell; stigma practically imperceptible; halteres brownish yellow.

Length, 7 mm.

Described from a single ♀ in the Indian Museum from Theog, Simla Distr., 8000 ft., 1. v. 1907 (*Annandale*).

291. **Empis marginata**, *Brun.*

Pachymeria marginata, Brunetti, Rec. Ind. Mus. xiii, p. 79 (1917).

♀ *Head*: frons ash-grey, with parallel sides; ocellar triangle large, black; palpi bright orange; antennæ all black, 3rd joint considerably broadened at base, style joints distinct; occiput bluish grey, with bristles and stiff hairs. *Thorax* moderately dark grey, with a slight yellowish tinge; two dark median well-separated narrow stripes from anterior margin to well beyond middle; an outer stripe on each side, abbreviated, enlarged into an irregularly shaped and rather indefinite elongated large spot behind the suture; dorsum covered with short black hairs, except on the stripes; pleuræ concolorous, with black hairs; a bunch of bristly hairs on each humerus; two macrochætæ just in front of wing-base, and a fringe of long stiff black hairs on each side of the metanotum; scutellum concolorous, with four marginal bristles. *Abdomen* moderately dark ash-grey; hind margins of segments shining black, the colour extending forwards in centre nearly or quite to anterior margins; 5th segment wholly grey; 6th and 7th grey, shining black basally; venter grey; ovipositor black. *Legs*: coxæ grey, tips brownish yellow; femora in no way incrassated, brownish orange, a brown streak on upper side of fore pair, and traces of such on middle pair; tibiæ and tarsi brownish yellow, tips of joints of latter black. Femora with soft black pubescence, longest on underside of posterior pairs; hind pair with a row of eight or more bristles; tibiæ with soft black pubescence and longitudinal rows of bristles; tarsi pubescent. *Wings* very pale yellowish grey, unmarked; stigma absent; anterior cross-vein just before middle of discal cell; halteres brownish yellow.

Length, 5 mm. (to tip of ovipositor).

Described from a single ♀ in the Indian Museum, taken between Kugri and Phagu, Simla Distr., 21. v. 1906 (*Annandale* and *Kemp*).

Very like the European *femorata*, F., which might quite likely occur in the Western Himalayas, but differing radically in the hind femora showing no trace of incrassation.

292. **Empis elegans**, *Brun.*

Empis elegans, Brunetti, Rec. Ind. Mus. ix, p. 26 (1913).

♀ *Head* black; antennæ black; palpi large, yellow; proboscis twice the height of the head, black or blackish brown. *Thorax*

shining black, including sides, scutellum, and metanotum; wholly unmarked; a little soft whitish hair; distinct bristles apparently absent; a few stiff pale hairs towards hind margin and on scutellum. *Abdomen* darker brown, nearly bare; genitalia slender, normal, elongate, concolorous. *Legs* brownish yellow; hind coxæ, tips of tibiæ, and all the tarsi blackish. Femora quite bare; tibiæ with only a few short stiff hairs towards tips; tarsi pubescent. *Wings* clear, highly iridescent; anterior cross-vein just before middle of discal cell; stigma barely perceptible; halteres brownish yellow.

Length, 3 mm.

Described from two ♀ ♀ in the Indian Museum from Mundali, 12. v. 1910, taken in company with *E. griseonigra*

293. **Empis inconspicua**, *Brun.*

Empis inconspicua, Brunetti, Rec. Ind. Mus. ix, p. 28 (1913).

♂ *Head* blackish; antennæ black; palpi a little yellowish; proboscis twice the height of the head, yellow above, black below. *Thorax* of an intermediate shade between light and dark grey, with comparatively long and rather stiff hairs; four long stiff hairs on scutellum, which, with sides of thorax and metanotum, are concolorous, but lighter grey just below shoulders. *Abdomen* concolorous, rather broad and flat, with parallel sides and soft black pubescence. Genitalia blackish, with reddish-brown bisinuate terminal hooks; venter blackish. *Legs* uniformly dark brown, pubescent; middle tibiæ with four long stiff hairs on outer side; hind tibiæ with long hairs on hinder side. *Wings* pale grey; anterior cross-vein a little before $\frac{1}{4}$ of discal cell; stigma brownish, ill-defined, much elongated, and reaching the costal margin; halteres yellow.

Length, $2\frac{1}{4}$ mm.

Described from two ♂ ♂ in the Indian Museum from Lucknow, 17. i. 1908 (*type*) and 9. ii. 1908.

Genus **HILARA**, *Mg.*

Hilara, Meigen, Syst. Besch. iii, p. 1 (1822).

GENOTYPE, *Empis maura* (Europe); by Curtis's designation.

Allied to both *Empis* and *Rhamphomyia*.

Head in some species nearly as broad as the thorax, shorter than high. Eyes nearly always separated by a narrow frons in both sexes, but in some species contiguous in the male, in which case the upper facets are larger than the lower ones. Antennæ 3-jointed, with distinct 2-jointed style; 1st and 2nd joints short, about as long as broad, bristly; 3rd elongate-conical, bare, slightly compressed; 1st joint of style very short, 2nd elongate, cylindrical. Proboscis about as long as height of head or a little

shorter; palpi one-jointed, slightly curving upwards. *Thorax* rectangular, moderately arched. There are normally two strong straight bristles on upper side of prothorax; disc of thorax with weak dorso-central and acrostichal bristles; margin of dorsum generally with a humeral, post-humeral, one to three notopleural, one supra-alar, and a postalar bristle; scutellum generally with four bristles; metapleura bare. *Abdomen* slender, of 8 segments, cylindrical in male, with complex and rather uniform genitalia; broader and more pointed apically in female. *Legs* of normal length and form; fore metatarsus in the male nearly always more or less thickened; in the female the hind tibiæ not infrequently slightly compressed and curved; occasionally the hind femora in both sexes, or in male only, obviously thickened and suddenly narrowed at apex. Legs moderately pubescent, characteristic bristles often present; tibiæ generally with apical spurs. *Wings* as in *Empis*, except that the auxiliary vein distinctly reaches wing-margin; fork of 3rd vein perhaps less widely open; anal vein weaker, generally failing to attain wing-margin; axillary lobe well developed.

Range. World-wide.

Life-history. Beling has described the early stages of several European species. They appear to resemble the ordinary Dipterous larvæ and pupæ, the former being amphipneustic, of twelve segments, including the head; living in damp earth or amongst decaying leaves. The larva hibernates as in *Empis* and *Rhamphomyia*. The perfect insects are generally distributed, more commonly occurring in woods and fields and near water. They prey on small Diptera or other soft insects, and have often been captured *in copula* still carrying their prey, which is enveloped in a little web, said to be spun from the mouth of the male.

Only four Indian species are described. Walker's *bares* is unknown to me and may possibly be identical with my *compacta*.

Table of Species.

Thorax blackish or greyish.	
Body brown..	*bares*, Walk., p. 359.
Body blackish; fore metatarsi relatively smaller	*compacta*, Brun., p. 358.
Body blackish grey; fore metatarsi relatively larger	*peshawarensis*, sp. n., p. 360.
Thorax bright light yellowish brown .	*rufithorax*, Brun., p. 359.

294. **Hilara compacta**, *Brun.*

Hilara compacta, Brunetti, Rec. Ind. Mus. ix, p. 30 (1913).

♂. *Head* blackish; frons rather narrow; antennæ with greyish reflections viewed from certain angles. Proboscis about as long as height of head, shining black above; labium, which is shining yellowish, much longer than the hypopharynx and sharply pointed; palpi large, nearly as long as proboscis, brownish,

yellow, pubescent. *Thorax* wholly dark grey, including sides, scutellum, and metanotum; a little black pubescence, and some stronger hairs on dorsum laterally. *Abdomen* blackish, pubescent, sometimes pale below at base; genitalia a little broader than the abdomen. *Legs* pale yellowish brown, pubescent; tibiæ with a row of longer stiff hairs on outer side; front metatarsi much

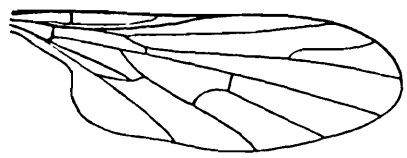

Fig. 32.—*Hilara compacta*, Brun., wing.

thickened, as wide as the tibiæ, and longer than the remaining fore tarsal joints; posterior metatarsi normal, not so long as the remaining tarsal joints. *Wings* pale grey; stigma elongate, pale brownish, ill-defined; halteres dirty brownish yellow.

Length, barely 2½ mm.

Described from three ♂ ♂ in the Indian Museum from Simla, 16. v. 1909 (*type*) and 9. v. 1909 (*Annandale*).

295. **Hilara bares**, *Walk.*

Hilara bares, Walker, List Dipt. Brit. Mus. iii, p. 491 (1849).

"Body brown, clothed with short black hairs; eyes dark red; feelers and mouth black; breast hoary; legs tawny, clothed with short black hairs; feet brown; wings light brown, darker for one-third of the length along the fore-border; wing-ribs and veins piceous; poisers brown. Length of the body, 1¼ line; of the wings, 3 lines.

"East India. Presented by Capt. Parry."

Type in the British Museum.

296. **Hilara rufithorax**, *Brun.*

Empimorpha rufithorax, Brunetti, Rec. Ind. Mus. ix, p. 30 (1913).

♂. *Head*: occiput, frons, which is moderately wide with parallel linear edges, and face all black, with a few black bristles, the latter with a pair of long bristly hairs; vertex with three distinct large reddish ocelli, with a pair of strong divaricate bristles between the upper ones. Antennæ yellow; 3rd joint elongate onion-shaped, with a long closely pubescent black arista, ending in a small bare black pointed bristle; the first two antennal joints with some short bristles near their tips. Proboscis about as long as the height of the head, the basal half yellowish, the apical half blackish; palpi very long, longer than proboscis, somewhat broadened and flattened at the tips, with a few yellowish hairs. *Thorax* bright light yellowish brown, with three black dorsal stripes, of which the median one is of moderate width, the

outer ones are broad enough to extend over the lateral margins, and all three attain the anterior margin of the dorsum; a few bristly hairs about the roots of the wings and much smaller ones on the dorsal stripes; sides a little more yellowish than the dorsum, with which latter the scutellum and metanotum are concolorous, the scutellum bearing a few stiff black hairs on the hind margin; the metanotum a little dusky in the centre. *Abdomen* dark blackish brown, with black pubescence; genital organs dark grey, with a little pubescence; venter similar to dorsal side of abdomen. *Legs*: coxæ and femora yellowish; tibiæ dark brownish yellow, tarsi dark brown; front metatarsi considerably widened; all the legs shortly pubescent; tibiæ with two rows of five or six long stiff hairs. *Wings* pale brown; stigma vague, very elongate, a little darker brown; halteres yellowish brown.

Length, nearly 4 mm.

Described from a single ♂ in the Indian Museum taken by me at Darjiling, 29. v. 1910, on the hillside.

297. **Hilara peshawarensis**, sp. nov.

♂ ♀ Whole insect blackish grey. *Head*: proboscis shining black, as long as height of head, with stiff hairs; antennæ robust, microscopically grey pubescent; palpi rather long, with moderately long bristly hairs. *Thorax* with almost microscopic yellowish-grey tomentum, which is more conspicuous on hinder part and on scutellum, the latter with four long marginal bristles. *Abdomen* with the segments more or less microscopically grey-dusted (in good specimens); some grey pubescence with longer bristly hairs on hind margins of segments; genitalia knob-like, rather large, concolorous, pubescent. *Legs* chestnut-brown, varying a little in colour, pubescent; fore metatarsus in ♂ very large, oval, much larger proportionately than in *H. compacta*; pubescence on front tibiæ becoming longer towards tip; knees yellowish; hind tibiæ in ♀ considerably, though not conspicuously, thickened except at base. *Wings* pale grey, iridescent, stigmatic region brownish; stigma darker brown, elongate, with ill-defined edges.

Length, 3 mm.

Described from a series of both sexes from Peshawar, N.W. India, 16. iii. 1913 (*Howlett*).

Type ♂ and ♀ sent to British Museum, cotype ♂ ♀ in Indian Museum and my collection.

Genus **HOWLETTIA**, *Brun.*

Howlettia, Brunetti, Rec. Ind. Mus. ix, p. 23 (1913).

GENOTYPE, *Howlettia flavipes*, Brun.

A genus of anomalous position, allied to the EMPINÆ, OCYDROMIINÆ, and TACHYDROMIINÆ (*Platypalpus*).

♀ *Head* with eyes separated above by a moderately broad frons and only very narrowly separated below antennæ. Antennæ

of three distinct joints; first two short, subequal; 3rd shortly conical, with a long terminal arista. Proboscis about equal to height of head, perpendicular; palpi half as long as proboscis or rather longer, quite broad. *Thorax* normally arched. *Abdomen* rather longer than thorax, somewhat compressed. *Legs* rather long and slender; fore coxæ slightly longer than posterior pairs; middle femora somewhat incrassated; all tarsi longer than tibiæ. *Wings* with auxiliary vein faint and incomplete; 1st longitudinal vein rather further from costa than usual, ending beyond middle of wing; 2nd vein beginning at one-fourth of wing, ending towards tip of costa; 3rd vein beginning at middle of wing; anterior cross-vein just beyond origin of 3rd vein, which latter ends at about wing-tip; 4th vein nearly straight, ending just below wing-tip; 5th nearly straight; 6th (anal) very long, complete to wing-border. Posterior cross-vein meeting 4th vein at spot where anterior cross-vein meets it, but not in the same straight line; anal cross-vein nearly perpendicular to anal vein; 2nd basal cell slightly longer than 1st, apex pointed; anal cell barely half as long as 2nd basal; discal cell absent.

♂ unknown.

Range. Only the type-species known.

The genus is named after Mr. F. M. Howlett, of the Agricultural Research Institute at Pusa.

298. **Howlettia flavipes**, *Brun.*

Howlettia flavipes, Brunetti, Rec. Ind. Mus. ix, p. 23 (1913).

♀ *Head* blackish; proboscis dark brown; palpi brownish yellow; ocellar triangle rather prominent. *Thorax* shining black, with very short whitish pubescence towards margins of dorsum; sides of thorax and dorsum of scutellum slightly grey-dusted; a few weak prealar bristly hairs. *Abdomen* black, a little shining; venter brownish yellow, with a little very short whitish pubescence. *Legs* brownish yellow, minutely pubescent, middle femora a little incrassated, with a row of very short bristles on underside; tarsi blackish. *Wings* clear, iridescent; venation in accordance with generic description; halteres dull brownish yellow.

Length, 2¾ mm.

Described from a single ♀ in the Pusa collection, now sent to the British Museum, from Mussoorie, ix. 1906 (*Howlett*).

This genus is left in the subfamily EMPINÆ for the present, but it is distinctly anomalous, and does not exactly fit into any subfamily. The distinctly though only moderately incrassated middle femora suggest the TACHYDROMIINÆ, from which the very distinct anal cell and complete anal vein combined separate it. The absence of the discal cell makes it abnormal in EMPINÆ. It has affinities with the OCYDROMIINÆ in the less distinct anal angle of the wing, though it is by no means cuneiform, also in the anal cross-vein being perpendicular to the anal vein.

Subfamily OCYDROMIINÆ.

Head: eyes in male contiguous, in female contiguous or not, rarely narrowly separated in both sexes. Proboscis generally shorter than head, if long, projecting directly or obliquely forwards; palpi one-jointed. Antennæ 3-jointed, with terminal arista or 2-jointed style, which latter may be aristiform. *Thorax* more or less humped; metapleura bare or with short hairs. *Wings* with axillary lobe well developed (except in *Leptopeza*); 3rd longitudinal vein simple; 4th simple or forked. Discal cell present; three or four posterior cells; basal cells subequal, anal cell not longer than 2nd basal. Lower branch of 5th longitudinal vein meeting anal vein parallel with, perpendicular to, or at an angle of 45° to hind margin of wing, making anal cell truncate at tip or the anterior margin of it the longer; anal vein of varying length; squamæ very small or absent.

This subfamily comprises smaller and more delicate species, often of pale colour, of which the short proboscis is a principal feature.

Genus **LEPTOPEZA**, *Macq.*

Lemtopeza, Macquart, Soc. Sci. Lille, p. 143 (1827) (*emend.*).

GENOTYPE, *Ocydromia flavipes*, Mg. (Europe).

Head almost as broad as thorax; eyes occupying whole front of head, contiguous in both sexes, rarely otherwise;* facets of uniform size. Antennæ 3-jointed; first two short, bristly; 3rd, though narrowed slightly at base, conical, bearing a long rather thickened bare arista joined to tip of 3rd by a minute joint. Epistome very narrow, the eyes reaching the mouth-opening; proboscis very short. *Thorax* rectangular, strongly arched, with minute discal bristles; on the margin generally a notopleural, postalar, and sometimes a supra-alar bristle, with other small bristles or bristly hairs; scutellum with two or more marginal bristles or stiff hairs; metapleura with short fine hairs. *Abdomen* slender, 8th segment small or hidden. Genitalia in male with asymmetrical parts; in female forming a long, compressed, sword-shaped ovipositor. *Legs* rather long and slender, hind pair longest; hind tibiæ sometimes slightly thickened towards apex; soft pubescence and various bristles on the legs. *Wings* with auxiliary vein abbreviated, not reaching margin; 3rd vein simple; anterior fork of upper branch of 4th vein indistinct or absent; lower branch of 5th vein strongly recurrent, parallel with hind margin of wing; anal vein shortened.

Range. Europe, India, North Africa, Cape Horn, North America, Australia.

Life-history unknown.

* A narrow frons above in at least one European species (*sphenoptera*), yet the eyes contiguous below antennæ.

299. Leptopeza vitripennis, *Brun.* (Pl. IV, figs. 12, 13.)

Leptopeza vitripennis, Brunetti, Rec. Ind. Mus. ix, p. 31 (1913).

♂ ♀ *Head* blackish ; proboscis horizontal, as long as length of head ; shining black ; palpi short, porrect, black ; antennæ with elongate conical 3rd joint, arista long, black. *Thorax* very highly arched, shining black in middle of dorsum, with short whitish hairs laterally. *Abdomen* shining black, with short whitish pubescence ; venter similar. *Legs* rather pale pitch-brown, a little pubescent. *Wings* very clear and iridescent ; halteres black.

Length, 2 mm.

Described from a type ♂ from Oncha Gaon, Naina Tal Distr., 1–6. v. 1907, and a type ♀ and a second ♀ from Rangoon, 24. ii. 1908 (*Annandale*).

Types in the Indian Museum.

Subfamily HEMERODROMIINÆ.

Head with eyes separated in both sexes, frons sometimes narrower in ♂ ; eyes sometimes contiguous below ; when this is so, frontal facets larger than the others ; eyes sometimes pubescent. Proboscis short, not longer than height of head ; palpi 1- or (indistinctly) 2-jointed. Antennæ 3-jointed, with, in some genera, a 2-jointed style which may be aristiform ; one or two exceptions occur. *Thorax* longer than broad, but slightly arched ; metapleura bare, with short hairs or a few bristles. *Legs* with fore coxæ always lengthened, sometimes about as long as femora, always longer than posterior coxæ. Fore femora often incrassate and fore legs often raptorial. *Wings* cuneiform at base, the axillary lobe being greatly reduced or absent ; 3rd longitudinal vein simple or forked ; 4th vein forked ; lower branch of 5th vein may be distinctly recurrent, or placed perpendicularly to hind margin of wing, or absent. Four posterior cells ; discal cell present or absent ; basal cells more or less subequal ; anal cell longer or shorter than 2nd basal cell, or absent ; anal vein of varying length or absent ; squamæ absent.

The cuneiform wings and much elongated fore coxæ will easily distinguish members of this subfamily. Many of the yellowish forms of EMPIDÆ belong to it.

Table of Genera.

1. Third longitudinal vein forked	2. [p. 367.
Third longitudinal vein simple . .	PHYLLODROMIA, Zett.,
2. A cross-vein between 2nd and 3rd veins.	DOLICHOCEPHALA, Macq.,
No such cross-vein	3. [p. 370.
3. Discal cell absent	MICRODROMIA, Big.,
Discal cell present	4. [p. 366.
4. Proboscis thick, shorter than height of head	CLINOCERA, Mg., p. 364.
Proboscis thin, about as long as height of head	[p. 371. TRICHOPEZA, Rond.,

Genus **CLINOCERA**, *Mg.*

Clinocera, Meigen, Illig. Mag. ii, p. 271 (1803).
Hydrodromia, Macquart, Hist. Nat. Dipt. ii, p. 658 (1835).
Paramesia, Macquart (*nec* Steph. 1829), *loc. cit.* p. 656 (1835).

GENOTYPE, *Clinocera nigra*, Mg.

Head usually broader than long, nearly or quite as long as thorax; epistome more or less elongated downwards; eyes well separated in both sexes, shortly and densely pubescent, facets of uniform size. Proboscis very short and thick; palpi 1-jointed or indistinctly 2-jointed, short, slightly clavate at tip. Antennæ inserted above middle of head, 3-jointed; 1st joint cup-shaped, 2nd subglobular, bristly, both short; 3rd onion-shaped, about as long as first two together, with a thick styliform pubescent arista articulated to tip of 3rd joint by a microscopic joint. *Thorax* a little longer than broad, rectangular, moderately arched. A humeral (occasionally more than one), a post-humeral, one or two notopleural, a supra-alar, and postalar bristles present; scutellum with two long apical bristles, rarely more; metapleura with some hairs. *Abdomen* elongate, slender, the complex male genitalia concealing the reduced 7th and 8th segments; in female abdomen more pointed. *Legs* long and slender, fore coxæ not greatly elongated; front femora often thickened at base and with bristles below; legs shortly pubescent. *Wings* somewhat lengthened; auxiliary vein rather short but reaching margin; 1st longitudinal vein ending at about middle of wing; 2nd vein sometimes wavy—in some species with a sudden loop downwards enclosing the stigma; 3rd vein forked; discal cell present, varying in length, discal end pointed or truncate; lower branch of 5th vein strongly recurrent, parallel with hind margin of wing; anal cell with distal end bluntly pointed or rounded; anal vein abbreviated. Alula absent; alar squamula very small.

Range. Europe, Siberia, India, North America.

Life-history unknown; probably aquatic in larval state.

This genus has a facies distinguishing it easily from other EMPIDÆ, and with some resemblance to some water-haunting DOLICHOPODIDÆ. The elongate body and proportionately longer legs, the pubescent eyes and rather long wings, the usually greyish colour with lighter parts, and the not infrequently spotted wings, give them a characteristic appearance. All are found in the neighbourhood of water, running streams, or stagnant pools, on the surface of which most species appear capable of running with ease.

The European species of *Clinocera* may be fairly satisfactorily grouped into several subgenera, mostly set up by Mik; but as only two species are yet known from the Orient, of which at least one (*fluviatilis*) comes in *Clinocera*, *s. str.*, these subdivisions may be ignored here.

The two Indian species differ as follows :—

Brownish-grey species, with dark brownish-grey legs; length, 3 mm. .... *fluviatilis*, Brun.

Blackish-grey thorax, dark brown abdomen, brownish-yellow legs; length, 2 mm. *obscura*, Brun.

300. Clinocera fluviatilis, *Brun.*

Clinocera fluviatilis, Brunetti, Rec. Ind. Mus. ix, p. 34 (1913).

♂ *Head* brownish grey, with isolated black bristles on the occiput and a few on the frons; frontal tubercle bearing two divergent bristles. Antennæ black; 1st and 2nd joints subequal; 3rd onion-shaped, with moderately long, nearly bare arista. Proboscis and palpi blackish, both short. *Thorax* very dark brownish grey, nearly black, a whitish-grey stripe on the sides from just below the shoulder to as far as below the ends of the transverse

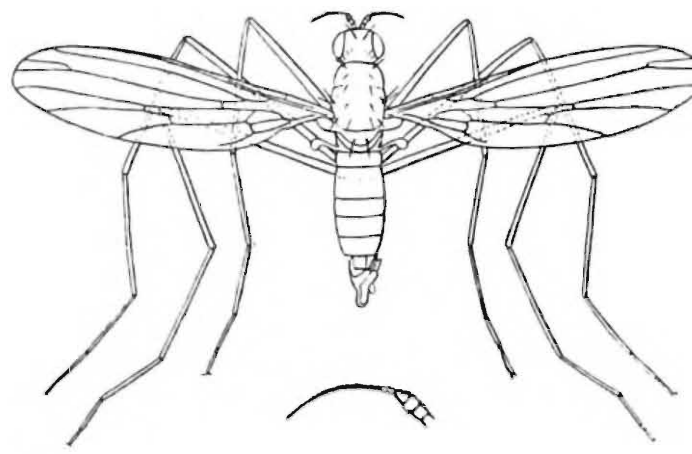

Fig. 33.—*Clinocera fluviatilis*, Brun., and antenna.

suture; ventral part of thorax also whitish grey. Dorsum bearing several isolated bristles (many of these are broken off), of which one is present on the shoulder, and one towards, but not at the hinder corner; scutellum with two long bristles. *Abdomen* dark grey, normally pubescent. Genitalia large, consisting of a ventral dark grey plate, a large concave lower piece, and a pair of claspers above, these latter constituted of a large oval basal concolorous joint and an elongate brownish-yellow horny bifid second joint; the whole of the genitalia a little pubescent. *Legs* long and slender, uniformly dark brownish grey, practically bare. *Wings* very pale grey. The 3rd longitudinal vein forked beyond three-fourths of its length, the branches approximate to one another and parallel; anterior cross-vein before middle of discal cell, and at about one-third the length of the wing; branches of upper branch of 4th longitudinal vein issuing close together from discal cell, thence gradually diverging; the discal cell much longer on its anterior border than its posterior one; lower branch of 4th vein nearly straight, rather more strongly developed; 2nd basal cell short, lying against the middle third of the upper basal cell;

anal cell barely longer than 2nd basal; 6th vein very short. Halteres: stem yellow, clubs dark grey.

Length, 3 mm.; wing, 4 mm.

Described from a single specimen from Bhowali, Kumaon Distr., 12. vi. 1910 (*Imms*), on stones on banks of stream.

A specimen which probably belongs to this species, but showing a discrepancy in the shape of the discal cell, is amongst the Diptera collected by Mr. Kemp on the Abor Expedition.

301. **Clinocera obscura**, *Brun.*

Clinocera obscura, Brunetti, Rec. Ind. Mus. ix, p. 34 (1913).

♂ *Head* blackish grey, some stiff hairs on occiput and frons, which latter is very broad. Proboscis short, half the height of the head, shining black, with a much swollen apical part (this latter in one specimen partly brownish yellow); palpi very small, brownish yellow. Antennal 3rd joint elongate oval, with long black arista. *Thorax* brownish grey, including scutellum; sides and metanotum bluish ash-grey; some dorso-central and lateral bristly hairs. *Abdomen* dark brown, softly pubescent. Genitalia extremely long and conspicuous, blackish, with a few pale hairs, egg-shaped, convex, bent under the venter, the narrower end pointing towards the base of the abdomen; posteriorly (*i. e.* from the broader end) project some yellowish filamentous appendages. *Legs* brownish yellow; coxæ ash-grey, especially the posterior pairs; tarsi a little darker. Fore femora with a few soft pale longer hairs; remainder of legs microscopically pubescent. *Wings* very pale grey, wholly unmarked, highly iridescent; halteres brownish yellow.

Length, 2 mm.

Described from two ♂ ♂ in the Indian Museum from Simla, 10. v. 1909 (*Annandale*).

Genus **MICRODROMIA**, *Big.*

Microdromya, Bigot, Ann. Soc. Ent. France, (3) v, p. 563 (1857) (*emend.*).

GENOTYPE, *Tachydromia oratorio*, Fln. (Europe).

This genus differs from *Clinocera* by the fore coxæ being nearly as long as the femora, the latter being considerably thickened. *Head* elongate, ovate; eyes more elongate than in *Clinocera* and sometimes contiguous below the antennæ; arista unjointed; proboscis about as long as height of head. *Thorax* with the major bristles apparently variable; metapleura bare. *Legs* with fore coxæ from rather shorter than to nearly as long as femora; fore femora much thickened, with two rows of short spines below, and a row of long bristles on each side; fore tibiæ curved at base, with a row of short spines on inner side and a long apical spine; posterior tibiæ without apical spur. *Wings* with subcostal vein short; no discal or anal cell; 3rd vein forked; lower branch

of 5th longitudinal vein absent or abortive; anal vein generally absent; no stigma.

Range. Europe, Siberia, India, Java, North America, Chile.

Life-history. The metamorphoses are known of *præcatoria*, Fln., a European species of *Hemerodromia*, of which *Microdromia* is generally regarded as a subgenus, and Brocher has described and figured them.* The larva lives in mud in streamlets, the pupa being also aquatic.

The perfect insects frequent the borders of woods and lakes, or humid places, generally on low herbage and in grass.

302. **Microdromia dorsalis**, *Brun.*

Chelipoda dorsalis, Brunetti, Rec. Ind. Mus. ix, p. 33 (1913).

♂ ♀ *Head* blackish; proboscis pale yellowish, very stout at the base, the upper piece prolonged into a long hard shining rostrum; antennæ wholly pale yellowish white. *Thorax* brownish yellow; dorsum black or dark brown, the colour extending more or less over the sides; scutellum and metanotum concolorous with dorsum. *Abdomen* brownish yellow; the dorsum of each segment black, thus forming a continuous black stripe from base to tip, but the hind borders of some of the segments escape the black colour; venter brownish yellow. Genitalia in ♂ large, wholly black, rather complex, comprising at least a pair of claspers, which are stout at the base and with flexible finger-like appendages; also a long narrow ventral style. *Legs* very pale yellow; fore femora with a row of very short microscopic spines, fore tibiæ possessing two such rows; the fore femora also have a row of long stiff bristly hairs on the underside and two still longer ones below near the base. *Wings* clear, veins brown; halteres pale brownish yellow.

Length, 2 mm.

Described from three specimens in the Indian Museum, taken at the edge of a small stream at Barogh, Simla Hills, 5000 ft., 10. v. 1910 (*Annandale*).

Genus **PHYLLODROMIA**, *Zett.*

Phyllodromia, Zetterstedt, Isis, 1837, p. 31.
Chiromantis, Rondani, Dipt. Ital. Prod. i, p. 148 (1856).
Thamnodromia, Mik, Wien. Ent. Zeitg. v, p. 278 (1886).
Litanomyia, Melander, Trans. Amer. Ent. Soc. xxviii, p. 231 (1902).

GENOTYPE uncertain.†

Head rather elongate and flattened, broader than thorax; eyes large, elongate, separated in both sexes, subcontiguous below

* Ann. de Biologie Lacustre, iv, p. 44, figs. 1, 2 (1909).

† There seems some obscurity as to the genotypes of *Chelipoda* and *Phyllodromia*, which it is impossible to clear up here owing to the "Mém. Soc. Sci. Lille" not being available in India. Rondani in 1856 selected *Empis melanocephala*, F., as type of *Phyllodromia*, the same species which Coquillett chose as type of *Chelipoda* in 1910.

antennæ, with facets of uniform size; proboscis short, thick, vertical; palpi one-jointed. Antennæ inserted a little below the middle, 3-jointed; basal joints short; 3rd elongate, pointed, with long terminal arista, attached by means of a minute joint. *Thorax* rectangular, moderately arched; prothorax forming a short neck. A few uniserial dorso-central bristles; a notopleural and supra-alar bristle present; scutellum with two bristles; metapleura with a few bristles. *Abdomen* with last two segments in male reduced, hidden by the genitalia, which latter are rather large; abdomen in female more pointed, genitalia normal. *Legs* as in *Chelipoda*; fore coxæ nearly as long as fore femora. *Wings* in venation and shape as in *Chelipoda*; discal cell present; anal angle not developed.

Range. Europe, India, N. America, Argentina.

Life-history unknown. The imagos frequent grass and damp meadows.

Phyllodromia, Zett., differs from *Chelipoda*, Macq., practically only in the presence of the discal cell, and is ranked as a subgenus of the latter in the Kertész Catalogue; but if the character is constant one way or the other in all the species, there seems no reason why both should not be admitted to generic rank. My *flavida* was placed in *Chelipoda* on the broader view of the genus, but must now be transferred to *Phyllodromia*, with my *indica*, the latter having been described under *Litanomyia*, which is now considered synonymous with Zetterstedt's genus.

P. flavida differs from *indica* by the thorax being mainly brownish yellow as opposed to blackish grey.

303. **Phyllodromia flavida,** *Brun.* (Pl. IV, figs. 14, 15.)

Chelipoda flavida, Brunetti, Rec. Ind. Mus. ix, p. 32 (1913).

♂ ♀ *Head* yellowish; three ocelli on the black vertical triangle, which also carries two divaricate long bristles; frons moderately broad; occiput with four long curved bristles placed equidistantly; seen from behind, the occiput has a greyish tinge, as has sometimes the frons also; eyes black, rounded, almost contiguous immediately below the antennæ for a short space, the face broadening below; the latter, seen from above, appears silvery white; proboscis very short, half the height of the head, conical, sharply pointed, yellowish, the upper part (hypopharynx) narrow, hard, shining. First two antennal joints yellowish, with some short bristles at the tips of each; 3rd joint dark brown, elongate onion-shaped, with long brown microscopically pubescent arista. *Thorax* very variable, generally brownish yellow, with more or less blackish colour, either in the form of a dorsal stripe, a lateral irregular and somewhat indistinct border, or the posterior part of the dorsum more or less blackish; sides generally lighter, in some specimens attaining a pinkish-fawn colour. *Abdomen* variable, brownish yellow, more or less blackish in part or wholly; venter brownish

yellow; genitalia small, concolorous. Tip of abdomen in ♂ stump-like; in ♀ tapering, the two terminal lamellæ pale yellowish. *Legs* yellowish or pale yellow; front coxæ narrow, cylindrical, nearly as long as the femora, the latter slightly brownish at tips and considerably incrassated, with two yellow

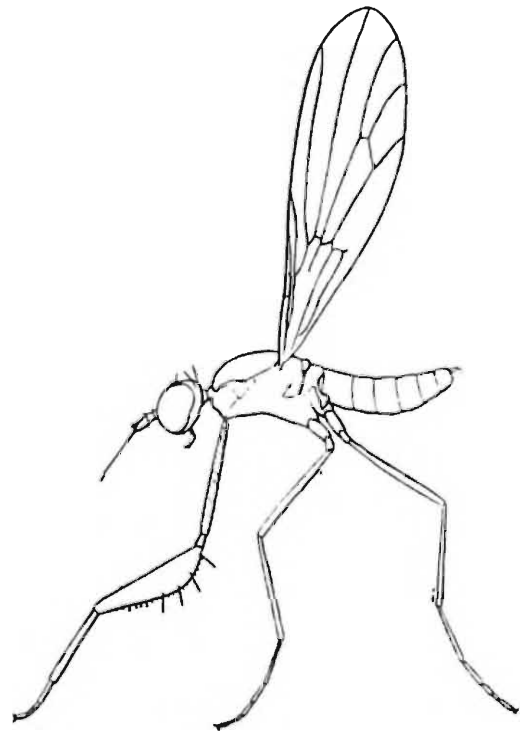

Fig. 34.—*Phyllodromia flavida*, Brun.

bristles near the base on the underside and a row there also of microscopic spines; posterior coxæ and femora of normal size, the former a little brownish, as are also the tips of the tarsi. *Wings* very pale grey, veins black; halteres brownish yellow.

Length, 2 mm.

Described from several specimens in the Indian Museum from Paresnath, 4000–4300 ft., Chota Nagpur, 9–13. iv. 1909 (*Annandale*), including *type* ♂ (9. iv. 1909); Dawna Hills, 2000–3000 ft., 2. iii. 1908, *type* ♀ (*Annandale*); Darjiling, 28. v. 1909 (*Brunetti*).

The Paresnath specimens were taken on stones, where they were in considerable numbers hidden in undergrowth at the edge of a spring.

304. **Phyllodromia indica**, *Brun.* (Pl. IV, figs. 16–18.)

Litanomyia indica, Brunetti, Rec. Ind. Mus. ix, p. 36 (1913).

♂ *Head* black; antennæ large, the 1st and 2nd joints yellowish; 3rd black, oblongo-conical, cup-shaped at bottom, and furnished with a long arista; face whitish grey; occiput and underside of head dark grey, the lower part of head projecting forward somewhat; proboscis short, pointed, and slightly curved. *Thorax* nearly as long as abdomen, oblongo-ovate, blackish grey, moderately shining. Three conspicuous bristles towards each side,

one on the shoulder, one towards the hind corner of the dorsum, and one about equidistantly between these two, this middle pair being rather closer to each other (that is, to the middle line of the thorax) than the others are, yet still a considerable distance apart; there is also one on the side of the thorax, in front of the wing; scutellum with two bristles. *Abdomen* dark brown, almost devoid of pubescence. *Legs* wholly pale yellow; fore femora much enlarged, fore coxæ and fore tibiæ each very slightly longer than the fore femora, the latter being spiny and bristly below; hind tibiæ very slightly enlarged, at the tip only. *Wings* very pale grey, a little yellowish towards base and costa, unmarked.

Length, 2 mm.

Described from one ♀ in the Indian Museum taken by me at Darjiling, 7000 ft., 29. v. 1910, on the hillside, in mixed herbage.

Genus **DOLICHOCEPHALA**, *Macq.*

Dolichocephala, Macquart, Soc. Sci. Lille, p. 147 (1823).
Ardoptera, Macquart, *op. cit.* p. 105 (1827).
Leptosceles, Haliday, Ent. Month. Mag. i, p. 160 (1833).

GENOTYPE, *Tachydromia irrorata*, Fln. (as *maculata*, Macq.) (Europe).

Head with epistome produced downwards, pointed; eyes rather large, somewhat elongate, widely separated in both sexes, with dense short pubescence; proboscis short, thick; palpi 1-jointed. Antennæ 3-jointed, placed just above middle of head, all the joints short and minutely pubescent; 2nd with bristles; 3rd rounded, somewhat disciform, with long, curved, rather thickened arista, which possesses a minute ring-like basal joint. *Thorax* rather elongate, with rounded anterior angles, moderately arched. Uniserial dorso-central bristles, a humeral, post-humeral, notopleural, and postalar bristle present, and two scutellar bristles; metapleura bare. *Abdomen* 8-segmented; the two anal segments reduced and partly concealed by the male genitalia; abdomen in female pointed. *Legs* slender; fore coxæ slightly elongated, about half as long as femora. Legs minutely pubescent; tibiæ without spurs; two pulvilli and a small linear bristle-bearing empodium. *Wings* with auxiliary and 1st longitudinal veins short, the former reaching the margin; 2nd vein long; 3rd vein forked, the upper branch united to 2nd vein towards its tip; lower branch of 5th vein strongly recurrent, almost immediately meeting anal vein (which is very abbreviated, not nearly reaching wing-margin), making anal cell very short and truncate. Dorsal cell very elongate, 2nd basal cell very short, much shorter than 1st basal and subequal to anal cell; three submarginal, four posterior cells; hind angle of wing quite reduced, making it almost cuneiform. Ground-colour of wing brown, with hyaline spots.

Range. Europe, India, North America.

A limited genus of small delicate Empids, easily recognised by the brown wings with pale spots.

305. Dolichocephala septemnotata, *Brun.* (Pl. IV, figs. 19–21.)

Dolichocephala septemnotata, Brunetti, Rec. Ind. Mus. ix, p. 35 (1913).

♂. *Head* blackish; frons broad, some stiff hairs on both frons and occiput; epistome (the whole of the head below the eyes) conical, short, half the height of the rest of the head. Antennæ black; 3rd joint conical, with long black thick arista, microscopically pubescent; no palpi apparent. *Thorax* and *abdomen* wholly black, moderately shining, practically bare, except for a few stiff hairs laterally on the former; genitalia small, rounded, simple. *Legs* pale yellowish, upper side of fore femora and tips of tarsi a little brownish. *Wings* very pale brown, with seven very distinct moderate-sized circular pale spots; six of these are placed in two parallel rows of three in each; the upper row just above the 3rd longitudinal vein, the lower row a little above the hind margin of the wing, so that the spots appear like three pairs situated longitudinally; the 1st pair (*i. e.* the basal spots of both rows) is situated a little before the middle of the wing; the 2nd pair a little beyond the middle; the 3rd pair half-way between the 2nd pair and the wing-tip, the upper spot being in the middle of the submarginal cell; of the spots in the longer row, the first is placed a little before, the second a little beyond the lower branch of the 5th longitudinal vein; the third is in the middle of the 2nd posterior cell; the seventh spot is near the wing-tip, at the end of the 1st posterior cell; the 3rd, 4th, and 5th longitudinal veins are all wavy, the 3rd is forked at two-thirds the length of the wing, the submarginal cell narrowed in the middle, with the marginal cross-vein just beyond the cell's base, uniting it to the 2nd longitudinal vein just before its tip; the 4th longitudinal vein, although wavy, is mainly in a straight line, and divides the wing into nearly equal parts, ending just below the wing-tip; anterior cross-vein very near base of wing; posterior cross-vein at middle of wing, joining the upper branch of the widely-forked 5th vein soon after the furcation; anal cell oblong, very short; halteres brownish yellow.

Length, 1½ mm.

Described from one ♂ in the Indian Museum from Simla, 10. v. 1909 (*Annandale*).

Genus **TRICHOPEZA,** *Rond.*

Tricopeza, Rondani, Dipt. Ital. Prod. i, p. 150 (1856) (*emend.*).

GENOTYPE, *Brachystoma longicornis,* Mg. (Europe); by original designation.

Head a little broader than long, slightly broader than thorax; eyes occupying whole front of head, shortly pubescent, separated above antennæ in both sexes, contiguous below for some distance, frontal facets in both sexes enlarged. Proboscis thin, nearly

as long as head, directed downwards; palpi 1-jointed, long, clavate, with long hairs. Antennæ placed above middle line of head, 3-jointed; 1st elongate, cylindrical, compressed at base; 2nd subglobular; 3rd three times as long as first two together, suddenly narrowing before one-fourth of its length and thence gradually tapering to a point; no style or arista.* *Thorax* rectangular, considerably arched. Some weak dorso-central bristles; a humeral, post-humeral, larger and smaller notopleural, supra-alar and postalar bristles present; scutellum with two bristles; metapleura bare. *Abdomen* rather long and slender, 8-segmented; the 7th and 8th segments in the male reduced, covered by the genitalia, which latter are complex, somewhat resembling those of *Hilara*. Abdomen in female rather thick at apex, with only six obvious segments, the 7th being peculiarly enlarged and the 8th concealed; ovipositor small. *Legs* long and slender; fore coxæ only slightly elongated; fore femora slightly thickened, with bristles below; posterior tibiæ with long bristles and small apical spurs. *Wings* with auxiliary vein not reaching margin; 3rd vein forked; discal cell present; lower branch of 5th vein recurrent, parallel with hind margin of wing.

Range. Besides my *fusca* the only other known species is *longicornis*, Mg., of Europe.

Life-history unknown.

306. **Trichopeza fusca**, *Brun.*

Trichopeza fusca, Brunetti, Rec. Ind. Mus. ix, p. 31 (1913).

♀ *Head* blackish, eyes subcontiguous. Antennæ with very long cylindrical 1st joint, short large subglobular 2nd joint, and very elongate conical 3rd joint, which has a very long thick curved minutely pubescent style. *Thorax* dark brown, lighter at the sides; scutellum and metanotum concolorous with dorsum. *Abdomen* dark brown, but a little lighter than the thorax; very sparsely pubescent; genitalia inconspicuous; venter brownish yellow. *Legs* long and slender, uniformly pale yellowish, except the blackish tarsi. Fore coxæ twice as long as the others, but one-third the length of the fore femora; all the femora approximately equal in length; tibiæ very little shorter than femora, hind pair a little incrassated at the tips; tarsi about as long as tibiæ, blackish. All the femora possess a few isolated long stiff hairs on the underside, and the middle femora have one on the front side near the tip; all the tibiæ with one such stiff hair on outer side a little before the first third of the length, and a few shorter ones on hinder side of middle tibiæ, also a single one

* Lundbeck describes the 3rd joint as tapering into an arista, stating that a microscope fails to show any articulation. In such a case a simple joint only must be recognised.

on hinder side of hind tibiæ at about one-third of the length. *Wings* very pale grey, very iridescent; 3rd longitudinal vein widely forked beyond half its length; prongs of upper branch of 4th vein issuing wide apart from the discal cell, the latter being

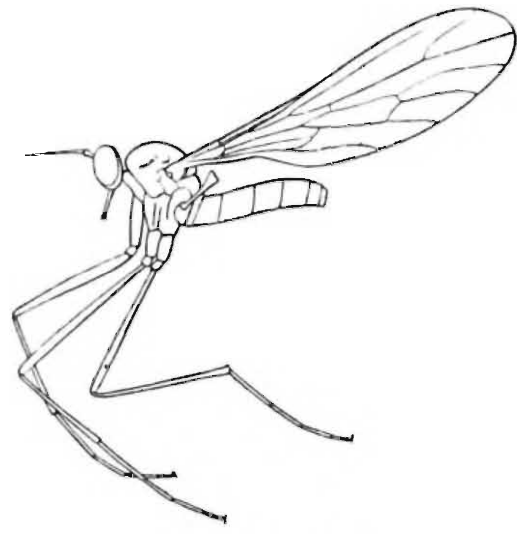

Fig. 35.—*Trichopeza fusca*, Brun.

large, long, pointed basally, about equal in length to 2nd posterior cell; 1st basal cell a little longer than 2nd, which latter is about as long as anal cell; halteres yellow.

Length, 3 mm.; wing, $4\frac{3}{4}$ mm.

Described from a unique ♀ in the Indian Museum from Kurseong, 25. iii. 1910 (*Gravely*).

The peculiar nature of the antennæ ought easily to distinguish this species from all other Indian EMPIDÆ.

Subfamily TACHYDROMIINÆ.

Head with eyes more variable than in the other subfamilies, generally separated above the antennæ in both sexes; below they may be contiguous or separated; when contiguous below, the frontal facets may or may not be larger than the others; in some genera the eyes microscopically pubescent. Proboscis short, sometimes curved; palpi 1-jointed. Antennæ 3-jointed, with a styliform arista of one or two joints. *Thorax* often nearly as broad as long; metapleura bare, or with very short hairs. *Legs* of varying lengths; sometimes the fore femora or four anterior femora thickened, in which case the four anterior legs are raptorial; middle tibiæ sometimes with a spine. *Wings* with axillary lobe more or less developed; 3rd and 4th longitudinal veins simple; three posterior cells; no discal cell; lower branch of 5th vein present or absent; basal cells rather large, subequal

or the 2nd the longer; anal cell normally absent, when present shorter than basal cells and anal vein weak, usually accompanied by the character of incrassated middle femora; anal vein weak or absent; squamæ absent.

This subfamily is distinguished by the (normal) absence of the anal vein, or, when it is present, by the thickened middle femora. Some genera with shortened abdomens and thick-set bodies are included here. Many species are of yellow or brown shades of colour.

Table of Genera.

1. Anal cell absent.	2.
Anal cell normally present, sometimes feeble or incomplete	[p. 374. TACHYDROMIA, Mg.,
2. A portion of the lower branch of the 5th longitudinal vein present; anal (6th) vein absent	[p. 378. TACHYPEZA, Mg.,
Lower branch of 5th vein, also anal vein, entirely absent...	3.
3. Legs short and robust; abdomen short and broad; 3rd antennal joint short, ovate...	DRAPETIS, Mg., p. 380.
Legs slender; abdomen more elongate, relatively less broad; 3rd antennal joint elongate, conical .	[p. 384. ELAPHROPEZA, Macq.,

Genus **TACHYDROMIA**, *Mg.*

Tachydromia, Meigen, Illig. Mag. ii, p. 269 (1803).
Sicus, Latreille (*nec* Scop. 1763), Précis Caract. Gen. Ins. xiv, p. 158 (1796).
Phoroxypha, Rondani, Dipt. Ital. Prod. i, p. 146 (1856).
Platypalpus, Macquart, Soc. Sci. Lille, p. 92 (1827).
Brevios, Brunetti, Rec. Ind. Mus. ix, p. 22 (1913).

GENOTYPE, *Tachydromia connexa*, Mg. (as *cimicoides*, F.) (Europe); by designation of Coquillett (1903).

Head rounded, as broad as thorax or nearly so, a little higher than broad; eyes rather elongate, separated in both sexes by a rather narrow frons, subcontiguous below antennæ, facets of uniform size. Proboscis short, vertical; palpi 1-jointed, of variable size. Antennæ inserted about middle of head, 3-jointed; 1st very short, subcylindrical; 2nd somewhat rounded, bristly towards tip; 3rd considerably elongate, sometimes more than twice as long as first two together, approximately conical, slightly compressed at about the middle, with very long, microscopically pubescent arista, which possesses a minute basal joint. *Thorax* rectangular, moderately arched. No definite discal bristles, but the hairs on the disc may be more or less arranged into dorsocentral and acrostichal rows; one to three notopleural bristles and one postalar; generally a humeral, sometimes a post-humeral bristle; two or four scutellar bristles; metapleura bare. *Abdomen* in male cylindrical, tip bluntly pointed in female; male genitalia large, knob-like, hiding 8th segment. *Legs*: anterior pairs

raptorial; fore coxæ slightly longer than posterior ones; fore femora more or less thickened, with two rows of fine bristles below; middle femora considerably incrassate, with two rows of short thick spines below; middle tibiæ often with an apical spine on inner side and a row of black spines below. Other variations occur in the legs in the shape of additional spines or bristles, and in the degree of incrassation of the femora. Two pulvilli; empodium small, linear. *Wings* with auxiliary vein united to 1st longitudinal till near tip, reaching margin; 1st, 2nd, and 3rd (which is simple) normal; 4th simple; lower branch of 5th almost or quite recurrent, meeting the indistinct and incomplete anal vein at about a right angle. Discal cell absent; both basal cells long, subequal; anal cell incomplete through the wanting basal portion of the anal vein; 1st posterior cell often broadened in middle and distinctly narrowed at tip; axillary lobe of wing not conspicuous.

Range. Europe, India, Tibet, China, Papua, North Africa, North America, Chile, Argentina.

Life-history. Beling has recorded the metamorphoses of a European species *T.* (*Platypalpus*) *major*, Zett.,* which was breeding on the ground under moss in a wood.

Tachydromia is a genus with a rather easily recognised facies, due to the thickened femora, long antennæ, absence of discal cell in conjunction with the shape of the 1st posterior cell, and incomplete or absent anal cell. The species occur in woods and fields, running swiftly over low herbage in search of prey; they are very carnivorous and rapacious, remains of soft Diptera being often retained by their middle legs after death. Many species are conspicuous amongst EMPIDÆ by their yellow colour.

Table of Species.

1. Wings unmarked	2. [p. 375.
Wings with two broad blackish bands	*latifascipennis*, Brun.,
2. Thorax bright ferruginous	3.
Thorax black or blackish	4.
3. Antennal basal joints yellow; thorax with distinct median stripe; proboscis as long as height of head	[p. 376. *ferruginea*, Brun.,
Antennæ all black; thorax without a median stripe, but with two abbreviated lateral ones; proboscis shorter than height of head	[p. 377. *nepalensis*, nom. nov., *gentilis*, Brun., p. 377.
4. Proboscis as long as height of head. .	
Proboscis half as long as height of head	*orientalis*, Brun., p. 378.

307 Tachydromia latifascipennis, *Brun.*

Tachydromia latifascipennis, Brunetti, Rec. Ind. Mus. xiii, p. 81 (1917).

♂ ♀. *Head* shining black, bare; eyes separated above by a moderately broad frons of uniform width, contiguous on under-

* Verh. zool.-bot. Ges. Wien, xxxviii, p. 2 (1888).

side; antennal 1st joint moderately long, of usual shape, 2nd shortly conical, with long apical bristle, both joints brownish yellow; proboscis dark brown; palpi rather elongate, with long whitish-grey pubescence and a long apical black bristle; occiput grey; a pair of bristles behind vertex, a few shorter ones on back of head. *Thorax* elongate, as broad as abdomen, humeri not constricted from mesonotum; wholly shining black, bare; scutellum and pleuræ black; a distinct pre-alar bristle. *Abdomen* black, moderately shining, nearly bare; male genitalia large; abdomen of ♀ tapering, ovipositor normal. *Legs* black; fore coxæ distinctly but not greatly enlarged, sometimes with a pale spot on outer side; fore femora greatly incrassated, in some specimens with basal part brownish yellow, in others with two pale spots on outer side, near base; in some the whole femur blackish brown; about basal half of all metatarsi yellowish. *Wings* grey, with two broad blackish bands, occupying greater part of wing, extending from costa to hind margin, leaving middle part of wing rather narrowly clear, and a moderately wide clear wing-tip and base; the blackish bands darker anteriorly.

Length, $2\frac{1}{4}$–$2\frac{1}{2}$ mm.

Described from a few of each sex in the Indian Museum: Darjiling, 8–11. viii. 1909, including type ♂ (*J. T. Jenkins*), and type ♀, 8. viii. 1909 (*Paiva*); Dharampur, Simla, 5000 ft., iv.–v. 1908; Simla, 7000 ft., 11. v. 1908 (both *Annandale*).

If *Platypalpus* can be regarded as distinct from *Tachydromia*, which seems doubtful, the three species of mine—*orientalis*, *gentilis*, and *ferrugineus*—will belong to it, as described; but my *P. palliditibiæ* and *P. incisa* belong to *Tachypeza*, the anal cross-vein being distinctly present in the former and a part of it in the latter.

308. **Tachydromia ferruginea**, *Brun.*

Platypalpus ferrugineus, Brunetti, Rec. Ind. Mus. ix, p. 40 (1913).

♀ *Head* rather dark brownish yellow; proportions, pubescence and bristles as in *orientalis* and *gentilis*; face blackish; antennæ with first two joints yellow, the 3rd blackish; proboscis as long as height of head, blackish; palpi short, rather thick, pale yellowish. *Thorax* rather bright ferruginous brown, shining, with a moderately broad black median dorsal stripe, beginning on the anterior margin, and a much shorter one on each side of it, these two not attaining either the anterior or posterior margin. Short sparse pale yellowish hairs over the dorsum and sides, most conspicuous just below the shoulders; two strong pre-alar bristles on each side, and one towards the posterior corner of the dorsum. Scutellum shining black, with very minute pale yellowish hairs and two long apical converging spines. Metanotum black, shining, with minute pale yellow hairs; sides of thorax black. *Abdomen* black, a little shining, almost bare; venter similar; genitalia pale yellowish, elongate. *Legs* bright yellow; fore femora a little

thickened; middle femora considerably thickened and with two rows of very small black spines and also a row of long stiff hairs, all placed on the underside; the middle tibiæ have a short but distinct spur-like tooth at the tip and a single row of minute black spines on the underside. *Wings* pale yellowish grey, veins a deeper yellow; surface of wing with short hairs and also microscopically setulose; halteres yellowish.

Length, 2 mm.

Described from a single ♀ in the Indian Museum from Kurseong, 4. vii. 1908 (*Annandale*).

309. **Tachydromia nepalensis**, nom. nov. (Pl. IV, fig. 22.)

Brevios longicornis, Brunetti, Rec. Ind. Mus. ix, p. 22 (1913).

♂ *Head*: occiput blackish grey, with pale yellowish-grey pubescence; eyes closely contiguous; antennæ blackish, 3rd joint and its style with rather dense whitish pubescence; proboscis shorter than height of head, yellowish. *Thorax* bright ferruginous, also scutellum and metanotum; a short black streak above each wing apparently joined together near posterior margin by an irregular blackish mark (thorax slightly damaged in this spot

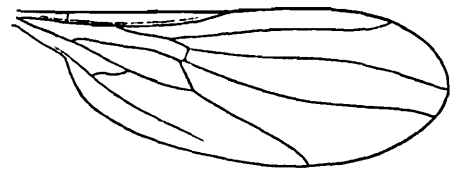

Fig. 36.—*Tachydromia nepalensis*, Brun., wing.

by the pin); sides grey. *Abdomen* black, roughened, nearly bare; genitalia rather large, black. *Legs* all wholly pale brownish yellow, with soft pubescence; middle femora slightly thickened. *Wings* pale grey, highly iridescent; a slight obliteration of the veins at tips of basal cells; venation in accordance with the generic diagnosis; halteres brownish yellow.

Length, 2 mm.

Described from a single ♂ in the Indian Museum from Sarath, Nepal, 24. ii. 1908.

The present species, being now referred to this genus, has to be renamed, on account of the European species *T. longicornis*, Mg.

310. **Tachydromia gentilis**, *Brun.*

Platypalpus gentilis, Brunetti, Rec. Ind. Mus. ix, p. 40 (1913).

♀ *Head* wholly blackish; antennæ and proboscis dull brownish yellow, the latter when fully protruded about as long as the height of the head, yellow at the base, black-tipped; palpi about half as long as the proboscis, stoutly cylindrical, pale yellow, with a few hairs. *Thorax* shining black, with sparse yellow hairs and a few lateral bristles; sides a little grey-dusted, as is more or

less the metanotum; scutellum shining black, with four yellow bristles. *Abdomen* black, moderately shining, shortly conical, almost bare; genitalia elongate; venter much as upper side. *Legs* pale brownish yellow; femora and tips of tarsi barely darker; the middle femora incrassated, and armed below as in *orientalis*. *Wings* clear; halteres yellowish.

Length, 2¼ mm.

Described from four ♀ ♀ in the Indian Museum taken by me at Darjiling, 26–29. v. 1910 (*type*, 28. v. 10); and one from Simla, 10. v. 1909 (*Annandale*).

311. **Tachydromia orientalis**, *Brun.*

Platypalpus orientalis, Brunetti, Rec. Ind. Mus. ix, p. 39 (1913).

♀ *Head*: occiput and frons covered with close pale yellowish-grey tomentum; frons with almost parallel sides; ocelli placed just below the vertex, with two proclinate bristles between them and with two similar bristles just behind the vertex, each of the latter placed in a minute black spot on the surface; two rows of distinct yellow hairs behind the eyes, below the vertical margin, and some on the lower part of the back of the head; antennal basal joints bright reddish yellow, 3rd joint darker brown, elongate onion-shaped, with normally formed arista; face grey, with pale grey hairs, which give it a whitish reflection when viewed from certain directions; proboscis about half the height of the head, shining black, elongate conical, bare; palpi nearly half as long as proboscis, yellow, of moderate size, cylindrical, with a few hairs. *Thorax* with close very short yellowish-grey or cinereous tomentum, and some lateral bristles; scutellum concolorous, with two strong apical converging bristles, and a smaller pair outside of these; metanotum concolorous, or in some examples more blackish grey. *Abdomen* dark mahogany brown or blackish brown, with a little short pale pubescence; a little broader on the middle segments, the apical half conical; the genitalia elongate, dark grey; venter similar to upper side. *Legs* bright brownish yellow; femora, especially posterior pairs, darker, or with a tinge of brown; tips of joints of tarsi also narrowly brown. *Wings* pale but distinctly yellow, veins a little deeper yellow; halteres yellowish.

Length, 3–4 mm.

Described from several ♀ ♀ in the Indian Museum taken by me at Darjiling, 7000 ft., 29. v. 1910.

Genus **TACHYPEZA**, *Mg.*

Tachypeza, Meigen, Syst. Besch. vii, p. 94 (1838).

GENOTYPE, *Tachydromia nubila*, Mg. (Europe); by Rondani's designation.

This genus is closely allied to *Tachydromia*, Mg. The eyes are contiguous below the antennæ, the facets in that region being a

little enlarged in both sexes; ocellar bristles absent; antennal arista unjointed; proboscis shorter than height of head. Scutellum with two bristles. Legs long and slender, the fore pair the shortest, the hind pair the longest; fore coxæ slightly elongated; fore femora thickened in both sexes, the middle femora slightly thickened; fore tibiæ sometimes somewhat thickened, more so in the male; tarsi long. Wings with venation as in *Tachydromia*, except that the anal cell is absent; lower branch of 5th vein present.

Range. Europe, India, Siberia, North America, Jamaica.

Life-history unknown.

The flies are found on tree-trunks, and running swiftly over low plants and bushes. They are raptorial and are said to be loth to fly.

Only two Indian species are known, distinguished as follows:—

Antennæ all black; length $1\frac{1}{2}$ mm.. . . .	*palliditibiæ*, Brun.
Antennæ with basal joints pale; length $2\frac{1}{2}$ mm.	*incisa*, Brun.

312. Tachypeza palliditibiæ, *Brun.*

Platypalpus palliditibiæ, Brunetti, Rec. Ind. Mus. ix, p. 41 (1913).

♂ *Head* blackish; frons and occiput with microscopic whitish hairs, some also on underside of head; antennæ black; proboscis mainly black, not so long as height of head; palpi nearly white, half as long as the proboscis. *Thorax* wholly blackish, with microscopic pale yellowish hairs; scutellum, metanotum, and sides all similar; bristles distributed as in the three previous species. *Abdomen* black, with sparse pale hairs, tip stump-like; genitalia of moderate size, rounded exteriorly, mainly withdrawn; venter like upper side. *Legs* yellowish; femora mainly blackish, as are the tarsi-tips. *Wings* clear; halteres: stem black, clubs whitish.

Length, $1\frac{1}{2}$ mm.

Described from one ♂ in the Indian Museum from Simla, 11. v. 1908 (*Annandale*).

313. Tachypeza incisa, *Brun.*

Platypalpus incisus, Brunetti, Rec. Ind. Mus. ix, p. 41 (1913).

♂ *Head* blackish, occiput with short whitish-grey hairs; frons moderately narrow, widened a little in the middle, at which place are situated the three limpid ocelli in the form of a triangle. Proboscis brownish yellow, half the height of the head; palpi pale yellow, with a few black bristles. Antennæ large; 2nd joint yellowish, with a row of short subapical bristles; 3rd dark brown, with minute pale pubescence, squarish or nearly V-shaped at tip, with a long thick arista from the upper angle at the tip. *Thorax* wholly shining black, bare, except for microscopic yellow hairs and two or three notopleural bristles; scutellum with two apical

bristles. *Abdomen* black, moderately shining, practically bare; venter similar. Genitalia rather large, black; a pair of claspers with large basal joint with long crooked terminal black hook-like appendages. *Legs* brownish yellow, fore coxæ half as long as the femora; anterior femora incrassated, hind femora not thickened, long; tarsi more or less brown; all the legs minutely pubescent. *Wings* microscopically setulose, pale brown, no stigma; venation normal, anal cell absent; the anal cross-vein present but incomplete.

Length, 2½ mm.

Described from a single ♂ in the Indian Museum from Simla, 20. vii. 1911 (*Annandale*).

Genus **DRAPETIS**, *Mg.*

Drapetis, Meigen, Syst. Besch. iii, p. 91 (1822).
Crossopalpus, Bigot, Ann. Soc. Ent. France, (3) v, p. 563 (1857).

GENOTYPE, *Drapetis exilis*, Mg. (Europe).

Head not so broad as thorax, but broader than high, rather short; eyes microscopically pubescent, separated in both sexes, sometimes narrowly just above antennæ, below which they are contiguous or nearly so, facets of uniform size. Proboscis short, vertical; palpi one-jointed. Antennæ inserted just above the middle, very short,* especially 1st joint; 2nd joint slightly broader at tip, bristly; 3rd conical, varying in length but always comparatively short, pointed, with a rather long apical arista, which is said to possess a microscopic basal joint. *Thorax* approximately square, with rounded corners, generally moderately arched, in some species more so; dorsum with fine pubescence. Chætotaxy apparently slightly variable, generally some dorsocentral, acrostichal, and notopleural bristles, with often a postalar and post-humeral bristle; scutellum with two bristles; metapleura practically or quite bare. *Abdomen* short and robust, 8-segmented, ending in male in a knob-like genital organ, in female in a point. *Legs* comparatively short and strong, fore and hind femora rather thickened; hind tibiæ sometimes ending in a projecting tooth. Legs shortly pubescent, with a few bristles; tibiæ spurred or not,† hind pair with a small bump at tip; empodium very small; setiform. *Wings* short, rounded, anal angle well developed; auxiliary vein inconspicuous, short, ending free; 1st, 2nd, and 3rd longitudinal veins slightly curved forward; 3rd, 4th, and 5th veins simple; a trace of an anal vein, but indistinct or unappreciable at base. Discal cell absent; 2nd basal cell much longer than 1st, truncate; anal cell absent.

* Melander describes the antennæ of this and some kindred genera as two-jointed. The 1st joint is often so small as to be overlooked, or it may conceivably be reduced to a mere facial protuberance.

† Schiner says that the front tibiæ are spurred.

Range. Europe, India, Burma, Java, North Africa, North America, St. Vincent, Chile, Australia.

Life-history unknown.

Drapetis is conspicuous amongst Empids on account of its short thick-set body, short robust legs, and the curved 1st, 2nd, and 3rd veins, in conjunction with the absence of the discal and anal cells. The flies frequent fields and meadows in preference to woods, running swiftly over the leaves. Lundbeck thinks some species hibernate in the imago stage.

One or two subgenera have been set up on, I think, rather weak or inconstant characters, and all the species are here retained under the one generic heading.

Table of Species.

1. Abdomen partly yellowish	2.
Abdomen wholly black	3.
2. First and last thirds of abdomen yellowish, middle third black	*variegata*, Brun., p. 381.
Abdomen dirty yellow, darker posteriorly	*discoidalis*, Bezzi, p. 382.
3 (*a*). Third antennal joint trapezoidal; all femora broadly black from base	*brevior*, Brun., p. 382.
(*b*). Third antennal joint onion-shaped; all femora with black streak above . .	*fascifemorata*, Brun., [p. 383.
(*c*). Third antennal joint nearly round; only hind femora with black streak on middle of upper side	*rotundicornis*, Brun., [p. 383.
(*d*). Third antennal joint obconical; legs all yellow except for brown tarsi-tips	*rufipes*, Brun., p. 383.

314. **Drapetis variegata**, *Brun.*

Drapetis variegata, Brunetti, Rec. Ind. Mus. ix, p. 39 (1913).

♀ *Head*: occiput and frons shining black; eyes as in *brevior*. First two joints of the antennæ dark brown; 3rd black, very elongate conical, with long apical arista. Proboscis short, brownish yellow, with yellow hairs. *Thorax* dark shining brown on anterior part, with three black, not very obvious stripes (with, however, linear edges), all of which begin on the anterior margin; posterior half of thorax more or less blackish. Scutellum yellowish, with blackish dorsum and two long curved apical bristles; metanotum shining brown. *Abdomen* with very sparse pale yellow hairs; basal third (except the extremely narrow black actual base) yellowish; middle third blackish; apical third yellowish or brownish yellow; venter yellowish (in one example somewhat blackish across the middle). *Legs* wholly bright yellow; coxæ brown, tarsi hardly, if at all, darker. *Wings* pale yellowish grey, iridescent; veins and halteres yellowish.

Length, 2½ mm.

Described from two ♀ ♀ (not ♂ ♂, as originally stated) from Rangoon, 25. ii. 1908 (*Annandale*).

315. **Drapetis discoidalis,** *Bezzi.*

Ctenodrapetis discoidalis, Bezzi, Ann. Mus. Hung. ii, p. 355 (1904).

♀ Near *D. gracilis,* Bezzi. *Head* elongate, rounded, black; eyes contiguous; antennæ short, yellowish white; arista rather long; proboscis elongate, yellow; palpi white. Ocelli and vertical bristles long. *Thorax* moderately arched, yellow, moderately shining; middle of dorsum black; humeral calli broadly yellow, leaving a median black line attaining anterior margin; short pubescence absent; acrostichal and dorso-central bristles long, projecting anteriorly; presutural and alar ones long. Scutellum shining black, two bristles; halteres yellow, clubs brown. *Abdomen* a little longer than thorax, dirty yellow, darkened above posteriorly; ovipositor rather long, conical, black, with pale short pubescence. *Legs* bright yellow, long, slender; posterior tibiæ with two bristles placed respectively on first and second thirds; at tip with a short obscure callus. *Wings* long, hyaline, narrowly cuneiform at base, 4th vein quite straight, a little curved towards 3rd; anterior and posterior wing-margins with dense short hairs.

Length, 2 mm.; wing, 2·2 mm.

One female from Matheran, Bombay, 800 metres, 8. vii. 1902.

Type in the Hungarian Museum.

316. **Drapetis brevior,** *Brun.* (Pl. IV, figs. 23, 24.)

Drapetis brevior, Brunetti, Rec. Ind. Mus. ix, p. 37 (1913).

♀ *Head* very dark grey; eyes contiguous for a considerable distance, rounded; vertical triangle dark grey, with three ocelli and two strong long proclinate bristles; two equally long ones behind the eyes, curved towards each other, with also some smaller ones; antennæ with first two joints dark brownish yellow, the 3rd black, as long as the 1st and 2nd taken together, with a very long black apical arista, microscopically setulose; face very narrow, dark grey; proboscis moderately long, bluntly but not shortly conical, with a patch of pale hairs on upper part of dorsal surface. *Thorax* well arched, shining black, with light short yellowish-grey pubescence and some bristles laterally; scutellum and metanotum shining black. *Abdomen* shining black, short, conical, very stout, covered rather freely with pale yellowish-grey hairs; venter similar; genitalia imperceptible. *Legs* bright brownish yellow, wholly clothed with rather copious yellow hairs; the femora broadly black from base to a variable extent, leaving sometimes only the tips pale; tips of tarsi black or blackish. *Wings* clear, microscopically setulose, highly iridescent; veins yellowish or brownish; halteres small, yellow.

Length, 2–2¼ mm.

Described from several examples in the Indian Museum from Mandalay, 12. iii. 1908, *type* (*Annandale*); Rangoon, 26. ii. 1908

(*Annandale*); Calcutta, 23. x. 1907; Puri, Orissa coast, 24. ii. 1908 (*Paiva*); Monghyr, Bengal, 23. ix. 1909 (*Jenkins*).

These specimens originally recorded as males were really females.

317 **Drapetis fascifemorata**, *Brun.*

Drapetis fascifemorata, Brunetti, Rec. Ind. Mus. ix, p. 38 (1913).

♀. Very near *D. brevior*, but the 3rd antennal joint is onion-shaped and much shorter than in that species. The legs are wholly reddish yellow, with a black streak on the upper side of the femora.

Length, 2 mm.

Described from a single ♀ in the Indian Museum from Kurseong, 4. vi. 1908 (*Annandale*).

This might have been considered provisionally the ♀ of *D. brevior* as the likeness between the two species is so great, and the difference in colour of the legs might easily be a sexual one only; but the different structure of the antennæ points to its being specifically distinct.

318. **Drapetis rotundicornis**, *Brun.* (Pl. IV, fig. 25.)

Drapetis rotundicornis, Brunetti, Rec. Ind. Mus. ix, p. 38 (1913).

♂. Very near *D. brevior*, from which it differs in the 3rd antennal joint being nearly round, drawn out to a slight point at the tip, from which the long arista projects. The anterior legs are all reddish yellow, the hind femora have the middle part blackish on the upper side.

Length, 2½ mm.

Described from a single ♂ in the Indian Museum from Puri, Orissa coast, 18–19. i. 1908 (*Annandale*).

In this species again I should have regarded it as a mere variation of *brevior* but for the different structure of the antennæ.

319. **Drapetis rufipes**, *Brun.*

Drapetis rufipes, Brunetti, Rec. Ind. Mus. ix, p. 38 (1913).

♀ Very near *D. brevior*. The 3rd antennal joint is obconical, black in colour, with an apical arista. Legs entirely reddish yellow; tips of tarsi brown.

Length, 2 mm.

Described from a ♀ in the Indian Museum taken by Dr. Annandale "at light" on board a steamer at Damukdia Ghat, Eastern Bengal, 30. vi. 1908; Madhupur, Bengal, 22. x. 1909 (*Paiva*).

My type specimen is a ♀, not a ♂, as originally stated.

Genus **ELAPHROPEZA**, *Macq.*

Elaphropeza, Macquart, Soc. Sci. Lille, p. 86 (1827).

GENOTYPE, *Tachydromia ephippiata*, Fln. (Europe); by original designation.

Head subspherical, narrower than thorax; eyes large, microscopically pubescent, separated above antennæ in both sexes (frons narrow), or contiguous in both sexes, facets of uniform size; proboscis short, vertical; palpi 1-jointed, broad; antennæ 3-jointed; basal joints short, 2nd rounded, bristly; 3rd elongate conical, with long, slightly pubescent, apical arista possessing a microscopic basal joint; epistome short. *Thorax* subquadrangular, with rounded corners. No distinct dorsal bristles; a notopleural, supra-alar, postalar, and two scutellar bristles; metapleura bare. *Abdomen* with last two segments in male hidden by the large genitalia, subcylindrical; in female pointed. *Legs* slender, fore coxæ only slightly elongated; fore tibiæ with short spurs; empodium small, claw-shaped. *Wings* as in *Drapetis*.

Range. Europe, India, Ceylon, Java, Papua, Philippines, Formosa, South Africa, North America, Australia.

Life-history unknown.

This genus is rather easily recognised by the usually yellow and black colour of the species, and the long arista, which is generally bent inwards in the Indian species.

Table of Species.

1.	Thorax shining black ..	2.
	Thorax brownish yellow	3.
2.	Basal half of abdomen reddish yellow, apical half black	*basalis*, Bezzi, p. 384.
	Abdomen wholly black....	*bicoloripes*, Brun., p. 385.
3.	Abdomen practically unicolorous ..	4.
	Abdomen with basal and apical portions pale, middle part black	5.
4.	Abdomen brown; tips of hind tibiæ, anterior tarsi, and last joint of hind tarsi black	*fulvithorax*, Wulp, p. 385.
	Abdomen blackish; legs wholly yellow to tips of tarsi	*ferruginea*, Brun., p. 386.
5.	Tarsi and tips of tibiæ brownish	*metatarsata*, Bezzi, p. 386.
	All legs wholly yellow	*variegata*, Brun., p. 387.

320. **Elaphropeza basalis**, *Bezzi.*

Elaphropeza basalis, Bezzi, Ann. Mus. Hung. ii, p. 349 (1904).

"♀ *Head* rounded, rather brilliantly shining black; occiput with grey tomentum; eyes narrowly separated above antennæ, contiguous below them; 3rd antennal joint moderately long, black; arista shorter than antennæ; palpi white. *Thorax* and scutellum all black, with pale pubescence and bristles. *Abdomen* as long as thorax, basal half reddish yellow, with rather short pale

pubescence, apical half black. *Legs* robust, nearly bare, wholly yellow, except the black last tarsal segment; hind tibiæ with one bristle only and a rather short tooth at tip on inner side; hind metatarsi with short thick pubescence below. *Wings* short, clear, anterior margin slightly ciliated; veins pale; 3rd and 4th veins gently diverging; 2nd ending midway between 1st and 3rd; 5th ending at some distance before margin.

"One female, Colombo, 28. ii. 1902 (*Biró*)." (*Bezzi.*)

Type in the Hungarian Museum.

321. **Elaphropeza bicoloripes**, *Brun.*

Elaphropeza bicoloripes, Brunetti, Rec. Ind. Mus. ix, p. 43 (1913).

♀ *Head* with eyes absolutely contiguous above and below antennæ for the full distance; occiput blackish, with stiff hairs above and softer hairs below; vertex with three whitish ocelli and two long stiff bristles; antennæ rather large, basal joints yellowish, wider at tips than bases, 2nd spinose on margin, 3rd brownish, elongate conical, pubescent, with very long arista; proboscis blackish; palpi short. *Thorax* shining black, lateral margins in front of wing narrowly brownish; dorsum with soft short pale hairs; stiff pre-apical hairs as usual. Scutellum black, shining, with two convergent long apical bristles; sides of thorax black. *Abdomen* shining black, apparently a tendency to a little paleness at base and to dark brown towards tip; very sparsely pubescent; venter similar. *Legs* brownish yellow; hind femora (except broadly at base), fore and hind tibiæ wholly, dark brown. *Wings* pale yellowish grey, iridescent; venation normal; halteres dirty brown.

Length, 1¾ mm.

Described from a single ♀ in the Pusa collection from Lower Lebong, 4500 ft., Darjiling Distr., 2–9. vi. 1909 (*F. M. Howlett*).

322. **Elaphropeza fulvithorax**, *Wulp.*

Elaphropeza fulvithorax, Wulp, Termés. Füzet. xx, p. 138 (1857).

"♂. *Head* globular; eyes contiguous above and below antennæ. Antennæ nearly as long as head; basal joints and base of 3rd yellow; the latter conical at tip, in front black, arista as long as antenna. *Thorax* and scutellum yellowish red, very shining; thoracic dorsum arched. *Abdomen* shorter than thorax, upper surface brown; sides and venter yellow. *Legs* yellow, tips of hind tibiæ, the anterior tarsi, and last joint of hind tarsi blackish. *Wings* distinctly longer than abdomen, brown tinged, especially about middle of anterior border; veins dark; posterior cross-vein also; ultimate portion of 4th longitudinal vein very indistinct; halteres whitish yellow.

"One male, Kandy, March." (*van der Wulp.*)

Length, 1½ mm.

323. Elaphropeza ferruginea, *Brun.*

Elaphropeza ferruginea, Brunetti, Rec. Ind. Mus. ix, p. 43 (1913).

♂ *Head* with eyes closely contiguous above and below the antennæ for the whole distance; vertex with three rather large ocelli; occiput light brownish yellow, with numerous stiff bristly hairs above and pale softer hairs on lower part. Antennæ with first two joints brownish yellow; 1st much shorter than 2nd, which latter is considerably setose at tip; 3rd joint very elongate conical, blackish, closely pubescent, with long microscopically pubescent arista. Proboscis very short, brownish yellow; palpi shorter still, pale yellow, each with a very long bristle. *Thorax* wholly brownish yellow, with numerous very short pale yellow hairs and the usual stiff pre-alar bristles; scutellum blackish, with two long bristles; sides of thorax concolorous with dorsum, metanotum blackish. *Abdomen* blackish, with a very little pale pubescence; ovipositor pale yellow, short. *Legs* wholly pale brownish yellow from coxæ to tips of tarsi. *Wings* pale yellow; halteres pale yellow.

Length, $1\frac{3}{4}$ mm.

Described from a *type* ♂ from Lower Lebong, Darjiling Hills, 4500 ft., 2–9. vi. 1909 (*Howlett*), and three other ♂♂ from Port Canning, 24. xii. 1907 (*Howlett*); all in the Pusa collection.

324. Elaphropeza metatarsata, *Bezzi.*

Elaphropeza metatarsata, Bezzi, Ann. Mus. Hung. ii, p. 348 (1904).

"♀ *Head* roundish, shining black; eyes contiguous below antennæ, separated above by a very narrow space, facets uniform in size; proboscis hardly prominent; palpi yellowish white. Antennæ long; two basal joints yellow; 3rd elongate, acuminate, dark brown, with long, microscopically pubescent, apical arista. Ocellar bristles rather long, proclinate; occiput with some small bristles. *Thorax* shining, with pale pubescence (the bristles in bad condition); a large shining black round spot towards each side near the middle; pubescence all reddish, that below the spot darker; halteres yellow, with dark clubs. *Abdomen* as long as thorax, with delicate white pubescence; base and tip of abdomen dirty yellow, towards middle shining black. *Legs* all yellow, only the tarsi and the tibiæ towards tips brownish; hind tibiæ with two bristles only on upper side; hind metatarsi long, narrower than tibiæ, with a sort of rounded yellow tooth at the base with an isolated rather long bristle behind it. *Wings* pale grey, with a distinct ciliation on anterior margin; 2nd longitudinal vein with tip ending nearer tip of 1st vein than that of 3rd; 3rd and 4th veins parallel; 5th ending at some distance before margin.

"One female, Colombo, 28. ii. 1902 (*Biró*)." (*Bezzi.*)

Type in the Hungarian Museum.

Bezzi notes that the species is allied to those of his subgenus *Ctenodrapetis*, from which it is distinguished by the elongate 3rd antennal joint.

325. Elaphropeza variegata, *Brun.*

Elaphropeza variegata, Brunetti, Rec. Ind. Mus. ix, p. 42 (1913).

♂ ♀ *Head* black; occiput with microscopic pale hairs; eyes contiguous, except for a small vertical triangle which carries the three ocelli. Antennæ with first two joints brownish yellow, a few bristles at the tip of the 2nd; the 3rd elongate conical, blackish, with long pubescent arista. Proboscis short, base much thickened, brownish yellow; palpi much shorter, pale yellow. *Thorax* bright ferruginous, a little blackish about the base of the wings and a thin black median stripe present or absent. Scutellum and metanotum concolorous with thoracic dorsum. A few lateral bristles on the latter, a few towards the posterior border and two on the scutellum. *Abdomen* with the tip stump-like in ♂, tapering in ♀; dull yellowish on basal and apical thirds, the middle third black; in some examples the basal third is more brownish than yellowish. Venter similar to upper side; genitalia small, concolorous. *Legs* all yellowish, except for the slightly brown coxæ; femora not at all thickened; hind tibiæ with two long stiff hairs on outer side, placed so as to divide the limb into three equal parts; middle tibiæ with a long single stiff hair near the tip. *Wings* pale yellowish grey; 2nd basal cell twice as long as 1st; halteres very pale yellow.

Length, barely 2 mm.

Described from several ♂ ♂ and ♀ ♀ in the Indian Museum: Calcutta, 5. xii. 1907, *type* ♂ (*Annandale*), 14. ix. 1909, *type* ♀ (*Paiva*): other specimens from Calcutta, 13. xiii. 1910 (*Kemp*), 31. i. 1908, 17. ii. 1908, 16. viii. 1907, 2–15. xii. 1907; Puri, 18–19. i. 1908; Khurda Rd., Puri Distr., 13. xi. 1910, in train (*Kemp*); Darjiling, 29. v. 1910 (*Brunetti*); Paresnath, W Bengal, 4000 ft., 9. iv. 1909 (*Annandale*); Parel, Bombay Presid., 26. xi. 1909; Satara Distr., Bombay, 4200 ft., 13–16. iv. 1912 (*Gravely*); Dum-Dum, near Calcutta, 28. vii. 1909 (*Lord*); Dibrugarh, Assam, 17–19. xi. 1911 (*Kemp*).

A very striking and easily recognised species.

Family LONCHOPTERIDÆ.

Head transverse, as broad as thorax, nearly oval when seen in profile; epistome short, sides bristly; eyes wide apart in both sexes, green in life; frons and mouth-border with strong bristles; three ocelli; proboscis distinct, thick. Antennæ 3-jointed; first two short, bristly; 3rd rounded, with long 3-jointed subdorsal or apical arista.

Thorax oval or subquadrate, rather flattened, bare, except for some bristles; scutellum subtriangular, bare, with two long bristles.

Abdomen oval, often narrower than thorax, 6-segmented, 1st

segment the longest; bristles present but no pubescence; genitalia in ♂ prominent, closely applied to the venter, with two lamellæ.

Legs rather long, with fine bristles; pulvilli very small, empodia absent.

Wings comparatively long, tip pointed; venation abnormal; auxiliary and 1st longitudinal veins very short; 2nd and 3rd veins ending near together towards wing-tip; 4th and 5th united for a considerable distance; 4th vein forked; 6th vein sexually abnormal; anterior cross-vein very near base of wing, oblique; discal cell therefore very long and open (or may be regarded as absent); the two basal cells and the anal cell all very short, subequal; alulæ absent; squamæ very small.

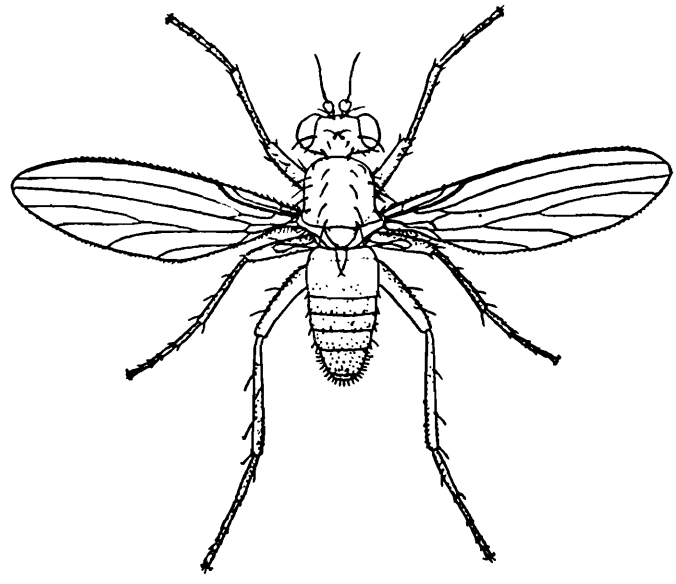

Fig. 37.—*Lonchoptera lutea*, Panz.

Life-history. The larvæ possess a head and ten body-segments, the last one possibly formed of two segments anastomosed; they live in decomposing vegetable matter; metamorphoses unknown. The perfect insects occur on leaves and low bushes, in grass, and near streams.

The affinities of this family have been questioned, but they seem best placed near the DOLICHOPODIDÆ. Only one genus, *Lonchoptera*, is known. *Cadrema*, Walk., with one species from Celebes is doubtfully referred to this family.

Genus **LONCHOPTERA**, *Mg.*

Lonchoptera, Meigen, Illig. Mag. ii, p. 272 (1803).
Dipsa, Fallén, Specim. entomol. p. 20 (1810); Dipt. Suec. Phytom. p. 1 (1823).
Lonchopteryx, Stephens, Syst. Cat. Brit. Ins. p. 259 (1829).

GENOTYPE, *Lonchoptera lutea*, Panz. (Europe); by Curtis's designation (1839).

The family characters apply wholly to this genus. The venation possesses the striking character, which is unique throughout the

whole order of the Diptera, of being different in the two sexes; the 6th vein in the ♂ running straight to the wing-margin, whereas in the ♀ it turns up towards its tip, meeting the 5th vein at some distance from the margin, thus forming a long closed cell.

The species are mainly brown or yellowish in colour and small in size, frequenting hedges, low-growing plants, shady nooks, grassy fields, and similar situations.

Range. Europe; the common *L. lutea*, with some of its varieties, extends to North America and to the East. One species is known from Rhodesia.

Life-history unknown; the larvæ live in decomposing vegetable matter and have been found under leaves.

326. Lonchoptera ? lutea, *Panz.**

Lonchoptera lutea, Panzer, Faun. Germ. cviii, pls. 20, 21 (1809); Schiner, Faun. Austr. i, p. 243 (1862); de Meijere, Tijd. v. Ent. xlix, p. 64 (1906).

♂ *Head* yellowish brown, a little paler on underside; eyes and antennæ black; ocellar triangle blackish; a row of fine rather weak vertical bristles; 2 post-vertical, all little more than hairs; 1 ocellar, 1 upper fronto-orbital, 1 lower fronto-orbital (near antennæ), all three strong; numerous bristles of different sizes around mouth and lower part of head. *Thorax* uniformly bright shining brown; a definite though not clearly-outlined median dark stripe from anterior to posterior margin, carried broadly over scutellum to its tip; a pair of very weak bristles or stiff hairs on anterior margin, 4 definite dorso-centrals, 1 on hind corner of dorsum in a line with the hindmost pair of dorso-centrals; 3 supra-alars; 3 or 4 on pleuræ, 1 below humeral region, 1 post-sutural, 1 scutellar (apical). *Abdomen* dark brown, sometimes light yellowish brown at sides towards tip; extreme tip (viewed from behind) with a small white dot; venter yellowish brown. *Legs* brownish yellow; extreme tips of tarsi and pulvilli blackish. *Wings* yellowish, iridescent; venation normal; halteres yellowish.

Length, 2½ mm.

Described from a ♂ from Coonoor in the Pusa collection, 4. ix. 1911, "sweeping roadside" (*Howlett*).

In two specimens from Darjiling, 6900 ft., 29. v. 1910 (*Brunetti*), the back of the head is all yellow, though this character probably has no importance. In one of the specimens the abdomen is yellowish, in the other nearly as dark as in the Coonoor example.

This appears to be the *L. lutea*, Panz., of Europe and other regions, though there are no specimens in good condition for comparison. Dr. de Meijere very kindly at my request sent

* In a comprehensive revision of the European species of this genus Dr. de Meijere gives a full list of the varieties and references to this common species. The accepted varieties are *cinerea*, Meij., *flavicauda*, Mg., *nitidifrons*, Strobl., *palustris*, Mg., and *trilineata*, Zett., and the synonyms are numerous, but are not repeated here in case the identification of the species should be incorrect.

me out a few from Holland, but they were rendered useless in transit, apparently through the box being opened by the Censor and insecurely re-packed. The only discrepancy between the Coonoor specimen and Verrall's figure ('British Flies,' v, fig. 51, p. 29) is the presence in the former of the bristle near the hind

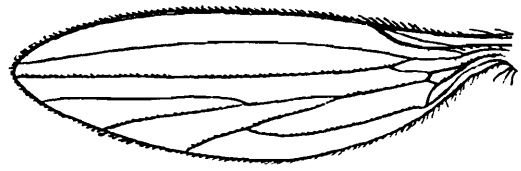

Fig. 38.—*Lonchoptera lutea*, Panz., ♀.

corners of the dorsum of the thorax, in a line with the hindermost pair of dorso-centrals. This bristle is not shown in Verrall's figure.

Three other forms of *Lonchoptera* have come before me, of which one is very striking, but it has unfortunately been accidentally damaged. The wings bear a conspicuous black band. The body is wholly black, the antennæ and legs yellow, the fore tibiæ and tarsi quite black. A single ♀ from Kumaon in the Pusa collection.

Family PLATYPEZIDÆ.

Head large; face small, broad, depressed down the middle in both sexes. Eyes bare, large, contiguous for a considerable distance in ♂ with enlarged upper facets; wide apart in ♀. Antennæ 3-jointed, short; arista long, bare, apical.

Thorax subquadrate, somewhat arched, not pubescent, but with a few chætotactic bristles, which are more distinct in the ♀; pleuræ bare; scutellum with marginal bristles.

Abdomen narrower and generally longer than the thorax; 6- or 7-segmented; genitalia in ♂ more or less incurved.

Legs (except in one non-Oriental genus, *Opetia*) with hind tibiæ dilated towards tip, and hind tarsi considerably dilated on first three or four joints.

Wings with a characteristic venation, peculiar to this family; auxiliary, 1st, 2nd, and 3rd veins long and nearly straight; 4th vein simple or forked, turned upwards towards tip in *Platypeza* and ending in wing-margin shortly but distinctly below tip of 3rd vein, so that the 1st posterior cell is always open; 5th and 6th veins straight, simple. Discal cell present or absent; basal cells short; anal cell always longer than 2nd basal, even if only slightly so. Squamæ of moderate size; halteres large.

The females of many species are of quite different coloration from the males, showing conspicuous, brightly-coloured markings on the thorax and abdomen.

The PLATYPEZIDÆ form a tolerably compact and limited group of small dark flies, possessing affinities with both the DOLICHOPODIDÆ and SYRPHIDÆ, being distinguished from the former by the holoptic males and generally incrassated front tarsi, dull colour, and short, thick-set build; and from the latter by the open 1st posterior cell, absence of the spurious vein and presence of chætotactic bristles. The peculiar bend in the 4th vein in *Platypeza* is suggestive of the "kink" in the same vein in the DOLICHOPODIDÆ. There seems to be no justification for allying the PHORIDÆ with the present group of families.

Life-history. The larvæ of very peculiar form, amphipneustic, flat, broadly oval, with jointed thread-like processes; the sides of the body sometimes deeply indented and serrate (*Callimyia*, non-Oriental); the head and next following segment often not visible from above, thus appearing as though only 9 or 10 were present, whereas there are 10 or 11 segments in addition to the head. They live in fungi, especially in species of *Boletus*, *Agaricus*, and *Lepiota*. The pupæ are very similar in appearance. The flies frequent low hedges and woods, where they run round quickly in small circles, varied from time to time (at least in the males) by hovering in the air. Verrall thinks some of the species may be two-brooded, the second one being the more numerous. Only the genus *Platypeza* has been yet recorded from India, but others with less characteristic venation may have been overlooked.

Genus **PLATYPEZA**, *Mg.*

Platypeza, Meigen,* Klass. Besch. Zweifl. Ins. p. 310 (1804); Brunetti, Rec. Ind. Mus. vii, p. 482 (1912).

GENOTYPE, *Platypeza fasciata*, Mg. (Europe); by Rondani's designation (1856).

Head large, as broad as thorax; eyes green in life, contiguous in ♂ for a considerable space, upper facets much enlarged; frons in ♀ about one-fourth of the head; proboscis short, labella broad; palpi wedge-shaped; face small, with distinct raised side margins. Antennæ small, porrect; 3rd joint a little longer than deep; arista apical, long, bare. *Thorax* rather oval or subquadrate, moderately arched, bare of pubescence, but with tiny bristles as well as larger chætotactic ones; traces of dorso-central rows, though very small, except the hinder two or three, which are very distinct; a strong presutural bristle, two or more between the shoulder and the wing-base, a large intra-humeral, and one on the posterior callus; sides bare; scutellum generally with two pairs of marginal bristles. *Abdomen* longer than thorax, rather flattened, elliptical, more pointed at tip in ♀; 6-segmented in ♂, hypopygium incurved;

* Though first described by Meigen in Illig. Mag. ii, p. 272 (1803), no species was then assigned to the genus.

7-segmented in ♀,* with two-jointed ovipositor; pubescence sparse, especially in ♀ *Legs* normal; hind tarsi with basal joints much dilated; hind tibiæ a little dilated towards tip; middle tibiæ spurred; pubescence slight. *Wings* proportionately very broad; auxiliary vein ending before middle of wing; 1st, 2nd, and 3rd longitudinal veins slightly sinuous, the last ending near wing-tip; 4th vein when near wing-margin bending suddenly upwards at a sharp or reflexed angle (with an appendix at the flexure), † the remaining section curved (the concavity hindwards), ending in wing-margin near tip of 3rd vein, but not meeting it; 5th and 6th veins straight. Three posterior cells; discal cell long, narrow; anal cell shortened, of varying length, always distinctly longer than 2nd basal cell, tip pointed. Anterior cross-vein near base of discal cell; posterior cross-vein near wing-margin. Alulæ rather long; squamæ moderately large; halteres large.

Range. Europe, North and South America, South Africa, and the Orient.

Life-history. Some species live in fungi, especially in *Boletus.*

327. **Platypeza argyrogyna,** *Meij.*

Platypeza argyrogyna, de Meijere, Tijd. v. Ent. l, p. 257 (1907).
Platypeza orientalis, Brunetti, Rec. Ind. Mus. vii, p. 481 (1912).
Platypeza obscura, Brunetti, *loc. cit.* p. 482 (1912).
? *Platypeza glaucescens,* Walker, Proc. Linn. Soc. Lond. iv, p. 117 (1860).

Head in ♂ with eyes varying from red to bright or dull brown in the upper facets, lower ones coffee-brown; vertical triangle small, greyish; ocelli very distinct; face greyish or whitish grey; proboscis brownish yellow, with very large labella marked with black; palpi yellow; antennæ brownish yellow, 3rd joint with microscopic whitish pubescence; arista black, yellowish at base;

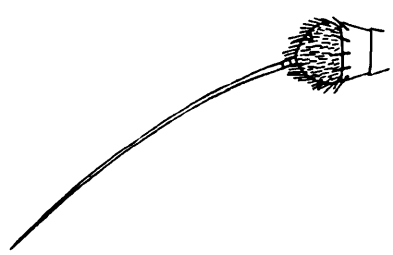

Fig. 39.—*Platypeza argyrogyna,* Meij., antenna.

occiput ash-grey or bluish grey, with minute black bristles. In ♀, frons about one-quarter of head, with parallel sides, dark brownish grey, with very short yellow hairs; antennal 3rd joint yellowish, often more or less darkened at tip; ocelli bright yellow. *Thorax*

* Exceptionally with only six segments in some European species.

† Some authors speak of the 4th vein as forked, the lower branch seldom reaching the wing-margin.

dull dark greyish brown, sometimes with traces of a darker median stripe;* frequently the anterior half in ♂ or whole dorsum in ♀ with a bluish-white shimmer, especially if viewed from behind; shoulders sometimes more or less shining; scutellum sometimes more yellowish. The humeri bear three subequal strong bristles or spines; a few smaller ones above them; two rows of minute dorso-central bristles are traceable, of which only the anterior two or three and the last two in each row are at all conspicuous, the last of all being by far the strongest; a strong bristle on each posterior corner, generally one or more smaller ones in the neighbourhood of the wing-base, and a number of stiff hairs on the dorsum behind the shoulders; scutellum with two pairs of apical bristles. *Abdomen* normally dull velvet-black, slightly shining in fresh specimens, bare, except for a little pubescence towards the side-margins; a very narrow—often indistinct or absent—greyish band on anterior margins of 3rd, 4th, and 5th segments. *Legs* brownish yellow, femora and tibiæ more or less dark, especially hind pair, which are sometimes dark brown; hind femora rather shining on inner side; first three tarsal joints much widened;

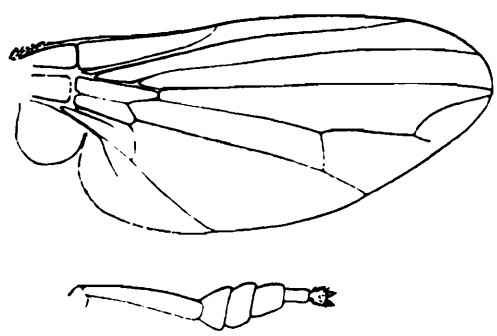

Fig. 40.—*Platypeza argyrogyna*, Meij., wing and hind leg.

hind tarsi in ♂ golden yellow, with a close row of minute black bristles at sides and along hind margins of each segment, giving the impression of being black-edged; in the ♀ the tarsi are brown, except the yellow first two joints.† *Wings* clear, iridescent; 1st vein slightly bisinuate, 3rd nearly straight, ending at wing-tip; anterior cross-vein before one-fifth of the discal cell; halteres brownish yellow, clubs more or less dark.

Length, $2\frac{1}{4}$–3 mm.

Redescribed from several specimens of both sexes in the Indian Museum, including the types of *orientalis* and *obscura* and a named ♂ ♀ sent from Java by de Meijere. Kurseong, 5000 ft., 4. vii. 1908, type ♂ and ♀ of *obscura* (*Annandale*); Sukna, E. Himalayas, 500 ft., 1. vii. 1908 (*Annandale*); Almora, Kumaon, 5500 ft., 20–21. ix. 1911 (*Paiva*); Pusa, 11. vii. 1913, 23. viii. 1913, 14. ix. 1914; Calcutta, 18. vii. 1908 (*Annandale*); Bangalore, S. India,

* According to de Meijere; I have not found it so myself.

† In my *obscura* the tarsi are wholly brownish in both sexes.

3000 ft., 16. x. 1910 (*Annandale*); Peradeniya, Ceylon, vii. 1919; Sadiya, Assam (type of *orientalis*).

There can be no reasonable doubt of the synonymy of my *orientalis*, and *argyrogyna* is also probably a synonym of *glaucescens*, Walker, but of this latter there is probably no specimen in existence, so de Meijere's name will presumably stand good. The sole difference between his species and Walker's is the black dot on the front of the head referred to by the older author, which seems a small matter in a "piceous black" species. *P. glaucescens* was described from Macassar, Celebes. As regards my *obscura*, it may be ranked for the present as a variety without any trace of shimmer on the thorax, and with the tarsi nearly uniformly brownish in both sexes.

ALPHABETICAL INDEX.

All names printed in italics are synonyms.

Acanthina, 26.
Acanthinia, 26.
Acanthinomyia, 26.
Acarterus, 334.
Acraspidea, 24.
Acromyia, 327.
Adoxomyia, 49.
affinis (Psilocephala), 306.
affinis (*Sargus*), 88.
afra (Anthrax), 240.
albescens (Geron), 280.
albida (*Anthrax*), 212.
albida (Exprosopa), 212.
albina (Psilocephala), 303.
albina (*Thereva*), 303.
albipes (*Pachygaster*), 21.
albipes (Zabrachia), 21.
albitarsis (*Microchrysa*), 86.
albobasalis(Chrysopilus), 140.
albofulva (Anthrax), 251.
albohalteralis (Empis), 350.
albomicans (Oxycera), 55.
albopictus (Chrysopilus), 131.
albosparsus (Bombylius), 270.
alexon (*Anthrax*), 211.
alexon (Exoprosopa), 211.
Allognosta, 93.
alternatus (Chrysopilus), 144.
amplitarsis (Empis), 349.
Ampsalis, 44.
Anastœchus, 278.
angustimarginatus (Oncodes), 171.
angustum (*Ephippium*), 46.
annandalei (Exoprosopa), 199.
annandalei (Hirmoneura), 149.
annandalei (Monacanthomyia), 23.
annulata (*Cephalocera*), 319.
annulata (Mydas), 319.
annulifemur (Zabrachia), 22.
annulipes (Beris), 92.
annulipes (*Chrysomyia*), 88.
annulipes (Pachygaster), 21.
ANTHRACINÆ, 176.
Anthrax, 234.
Antidoxion, 104.
aperta (Anthrax), 245.
Aphœbantus, 256.
apicalis (Ptecticus), 77.
apicipennis (Leptis), 125.
apicis (Hybos), 340.
appendiculata (*Argyramœba*), 222.
approximata (Anthrax), 244.
ardens (*Bombylius*), 274.
ardens (Dischistus), 274.
Ardoptera, 370.
argentea (*Acanthina*), 28.
argentea (*Gabaza*), 25.
argentea (Wallacea), 25.
argentiapicalis (Argyramœba), 227.
argentifrons (Geron), 279.
argentihirta (Acanthina), 28.
argentiventris (Phycus), 309.
Argyramœba, 214.
argyrogyna (Platypeza), 392.
Argyromœba, 214.
argyropyga (*Anthrax*), 218.
Argyrospila, 189.
Argyrospyla, 189.
Artemita, 26.
ARTHROCERATINÆ, 107.
Aspiloptera, 234.
assamensis (Allognosta), 95.
Astoma, 311.
Atherix, 120.
atra (Nemotelus), 20.
Atriadops, 154.
Atrichia, 311.
Atrichops, 112.
atripes (Phycus), 309.
aurantiaca (*Anthrax*), 186.
aurantiaca(Hyperalonia), 186.
aurata (Lasia), 164.
aureohirta (Anthrax), 252.
auricollis (*Acanthina*), 26.
aurifer (Ptecticus), 78.
aurifer (*Sargus*), 78.
auriflamma (Cyphomyia), 57.
auripes (Hybos), 341.

auripila (Pialea), 161.
auriplena (*Anthrax*), 212.
auriplena (Exoprosopa), 212.
aurobrunneus (Ptecticus), 76.
austeni (Hirmoneura), 152.
austeni (Spogostylum), 213.
australis (Ptecticus), 79.
azurea (Acanthina), 26.
azurea (*Cibotogaster*), 26.

baluchianus (Anthrax), 250.
barca (Stratiomyia), 59.
barca (*Stratiomys*), 59.
bares (Hilara), 359.
basalis (Elaphropeza), 384.
basalis (Hirmoneura), 149.
basifascia (*Anthrax*), 211.
basifascia (Exoprosopa), 211.
bengalensis (Exoprosopa), 206.
Biastes, 29.
bicolor (*Pterospilus*), 329.
bicolor (Rhachicerus), 105.
bicoloripes (Elaphropeza), 385.
bigoti (Argyramœba), 222.
bigoti (Syneches), 329.
bilineata (*Negritomyia*), 46.
bilineata (*Stratiomys*), 46.
bilineata (Thereva), 300.
bilineatum (*Ephippiomyia*), 46.
bilineatum (Ephippium), 46.
bimaculatus (*Anthrax*), 248.
binotata (*Exoprosopa*), 195.
bipars (Evaza), 32.
bipunctata (*Anthrax*), 217.
bipunctata (Argyramœba), 217.
birmanensis (Chrysopilus), 137.
bisetosus (Hybos), 338.
bispinosa (*Phyllophora*), 30.
bistriata (Clitellaria), 52.
bivittata (*Clitellaria*), 46.
BERINÆ, 89.
Beris, 90.
BOMBYLIIDÆ, 173.
BOMBYLIINÆ, 259.
Bombyliosoma, 273.
Bombylisoma, 273.
Bombylius, 261.
Bombylosoma, 273.
Brachycara, 85.
brahma (Exoprosopa), 206.
brevior (Drapetis), 382.
Brevios, 374.
brunnea (Eudmeta), 43.
brunnea (Hirmoneura), 151.
brunneus (Phycus), 307.
brunneus (*Xylophagus*), 307.
brunneus *var.* brunnipes (Phycus), 308.
brunnipes (Hybos), 343.

cæruleopennis (*Anthrax*), 181.
cærulescens (*Atherix*), 119.
cærulescens (Atrichops), 119.
calopa (Atrichops), 114.
calopa (Microchrysa), 88.
calopodata (*Subula*), 98.
calopodata (Xylomyia), 98.
canescens (*Phycus*), 307.
canescens (Xylophagus), 306.
capucina (Bibio), 189.
carbonaria (*Anthrax*), 217.
carbonaria (Empis), 351.
carmichaeli (Mydas), 318.
carthaginiensis (Empidideicus), 260.
centralis (Empis), 353.
Cephenes, 289.
Cephenus, 289.
cerioides (*Hermetia*), 40.
cervinus (Aphœbantus), 256.
Ceylonia, 155.
ceylonica (*Argyramœba*), 257.
ceylonica (Empis), 352.
ceylonica (Psilocephala), 304.
ceylonicus (Aphœbantus), 257.
chalybeata (Musca), 90.
chamæleon (Musca), 58.
Chiromantis, 367.
Chlorisops, 92.
Chloromyia, 84.
Chlorosia, 87.
Chorisops, 92.
Choristus, 261.
Chrysanthrax, 234.
chrysolampis (*Exoprosopa*), 182.
chrysolampis (Hyperalonia), 182.
Chrysomyia, 84.
Chrysopila, 128.
Chrysopilus, 128.
Cibotogaster, 26.
cincta (*Atherix*), 118.
cincta (Atrichops), 118.
cingularis (*Hermetia*), 42.
cingulata (Hirmoneura), 151.
cingulatus (*Anthrax*), 248.
cingulatus *var.* ceylonicus (Ptecticus), 80.
clara (Anthrax), 243.
claripennis (Argyramœba), 228.
clausa (Anthrax), 253.
clavata (Musca), 316.
Clinocera, 364.
Clitellaria, 49.
CLITELLARIINÆ, 38.
Clorisoma, 87.
cochinensis (Chrysopilus), 136.
CŒNOMYINÆ, 110.
Cœnomyiodes, 110.
coffeata (Hirmoneura), 152.
Colax, 154.
collaris (*Anthrax*), 194.
collaris (*Exoprosopa*), 195.
collaris (*Litorhynchus*), 195.
comastes (Bombylius), 268.
compacta (Hilara), 358.
compacta (Lepidanthrax), 233.
Cona, 311.
conica (Philopota), 158.
connexa (Tachydromia), 374.
Coquillettia, 214.
costalis (*Henops*), 169.
costalis (Oncodes), 169.

Craspedometopon, 28.
crassipes (Atherix), 112.
Crossopalpus, 380.
cupraria (Musca), 81.
cyanea (Odontomyia), 63.
cyaneus (Ptecticus), 75.
Cyclogaster, 52.
Cyclorhynchus, 284.
cylindrica (Thereva), 301.
Cyphomyia, 57.
CYRTIDÆ, 157.
CYRTINÆ, 163.

dahlii (Clitellaria), 49.
Dasypalpus, 284.
Defilippia, 189.
Desmomyia, 107.
dia (Anthrax), 250.
Dipalta, 234.
Dipsa, 388.
Dischistus, 273.
discoidalis (*Ctenodrapetis*), 382.
discoidalis (Drapetis), 382.
discoidalis (Leptis), 126.
disjuncta (Anthrax), 232.
distigma (*Anthrax*), 218.
distigma (Argyramœba), 218.
distigma (*Spogostylum*), 218.
dives (*Anthrax*), 180.
dives (*Eucharimyia*), 264.
dives (Hyperalonia), 180.
dohrni (Trichopsidea), 153.
Dolichocephala, 370.
dorsalis (*Chelipoda*), 367.
dorsalis (Microdromia), 367.
dorsoangulata (Odontomyia), 68.
dorsolineata (Pterodontia), 167.
Drapetis, 380.
duvaucelii (*Anthrax*), 225.
duvaucelii(Argyramœba), 225.

edwardsi (Cœnomyiodes), 111.
edwardsi (Systropus), 294.
Elaphropeza, 384.
Elasma, 29.
elegans (Empis), 356.
elegans (Suragina), 121.
elongata (Clitellaria), 26.
EMPIDÆ, 321.
Empidideicus, 260.
EMPINÆ, 344.
Empis, 347.
Enicopteryx, 345.
Enoplempis, 347.
ephippiata (Tachydromia), 384.
Ephippiomyia, 45.
Ephippium, 45.
ephippium (Stratiomys), 45.
erectus (Bombylius), 267.
Eriogaster, 347.
erythrocephalus (Anthrax), 178.
Eudmeta, 41.
Eulalia, 61.
eumenoides (Systropus), 294.
eupogonatus (Systœchus), 278.
Evasa, 31.
Evaza, 31.
exilis (Drapetis), 380.
Exoprosopa, 189.
Exoptata, 189.

fasciata (Platypeza), 391.
fascifemorata (Drapetis), 383.
fascipennis (Macellopalpus), 123.
fastuosa (Ptilocera), 34.
felderi (Acraspidea), 24.
fenestralis (*Musca*), 311.
fenestralis (Scenopinus), 312.
ferruginea (Elaphropeza), 386.
ferruginea (*Heliomyia*), 141.
ferruginea (Tachydromia), 376.
ferrugineus (*Platypalpus*), 376.
ferruginosus (Chrysopilus), 141.
ferruginosus (*Leptis*), 141.
fimbriatus (*Anthrax*), 240.
flammea (Exoprosopa), 193.
flaveolus (Macellopalpus), 122.
flavida (*Chelipoda*), 368.
flavida (Eudmeta), 43.
flavida (Phyllodromia), 368.
flavipalpis (Hybos), 342.
flavipennis (Exoprosopa), 192.
flavipes (Evaza), 32.
flavipes (Howlettia), 361.
flavipes (Ocydromia), 362.
flavipes (Parahybos), 343.
flavipes (Pterodontia), 165.
flavipes (*Subula*), 98.
flavipes (Xylomyia), 98.
flavipleura (Systropus), 295.
flaviventris (*Anthrax*), 183.
flaviventris (Hyperalonia), 183.
flaviventris (Microchrysa), 88.
flaviventris (*Sargus*), 88.
flavolineata (Thereva), 299.
flavopilosus (Chrysopilus), 138.
flavopunctatus (Chrysopilus), 133.
flavospinosus (Systœchus), 277.
fletcheri (Anthrax), 236.
florea (Volucella), 281.
fluviatilis (Clinocera), 365.
formicæformis (*Sargus*), 82.
formosa (Musca), 84.
fratellus (Syneches), 332.
frater (*Chrysopilus*), 141.
frontale (Craspedometopon), 29.
fulvescens (Stratiomyia), 60.
fulvicollis (Rhachicerus), 104.
fulvidus (Macellopalpus), 122.
fulvipes (Bombylius), 271.
fulvithorax (Elaphropeza), 385.
fusca (Trichopeza), 372.
fuscipennis (Acarterus), 335.
fuscipennis (Syneches), 323.
fuscitarsis (Beris), 93.
fuscolimbata (Anthrax), 246.
fuscus (Oncodes), 171.

Gabaza, 24.
gagatina (*Hybos*), 339.
gagatinus (Hybos), 339.
gemma (*Microchrysa*), 88.
gemmifer (Sargus), 81.
geniata (Ampsalis), 44.
geniculata (Beris), 91.
geniculata (*Hybos*), 340.
geniculatus (Hybos), 340.
gentilis (Argyramœba), 230.
gentilis (*Platypalpus*), 377.
gentilis (Tachydromia), 377.
Geron, 279.
gestroi (Argyramœba), 222.
gibbosa (Musca), 168.
glaucescens (*Platypeza*), 392.
gracilis (Phthiria), 285.
gravelyi (Chrysopilus), 137.
griseonigra (Empis), 353.
griseonigra (*Rhamphomyia*), 346.
grossipes (Musca), 336.
guttatipennis (Anthrax), 237.

Harpamerus, 334.
Heliomyia, 128.
HEMERODROMIINÆ, 363.
heminopla (Clitellaria), 50.
Hemipenthes, 234.
Henops, 168.
Hermetia, 39.
Hermoheura, 147.
Heteralonia, 189.
Heteroxycera, 53.
Hexacantha, 90.
Hilara, 357.
himalayana (Rhamphomyia), 346.
himalayanus (Anthrax), 238.
Hirmoneura, 147.
Holoclera, 345.
Hoplomyia, 58.
hottentotta (*Argyramœba*), 228.
hottentotta *var* claripennis (Anthrax), 247.
hottentottus (*Anthrax*), 248.
Howlettia, 360.
humeralis (Chrysopilus), 135.
Hyalanthrax, 234.
hyalina (*Anthrax*), 254.
hyaliventris (*Actina*), 93.
Hybos, 336.
HYBOTINÆ, 325.
hybridus (Bombylius), 279.
Hydrodromia, 364.
hydroleon (Musca), 61.
Hyperalonia, 178.
Hypoleon, 53.
hypoleon (Musca), 53.
Hypselura, 311.
Hyrmoneura, 147.
Hyrmophlœba, 147.

ibis (Atherix), 120.
Ibisia, 120.
illucens (Musca), 39.
illucens (Suragina), 121.
imberbis (Bibio), 302.
immaculata (*Odontomyia*), 67.
immaculatus (Syneches), 328.
inæqualis (Syneches), 330.
incisa (Tachypeza), 379.
incisus (*Platypalpus*), 379.
inconspicua (Empis), 357.
indianus (Leptomydas), 320.
indica (Biastes), 29.
indica (Cyphomyia), 57.
indica (Evaza), 33.
indica (*Litanomyia*), 369.
indica (*Oxycera*), 66.
indica (Phyllodromia), 369.
indica (Psilocephala), 304.
indica (Thereva), 301.
indica (*Tinda*), 30.
indicus (*Biastes*), 30.
indicus (Empidideicus), 260.
Inermia, 52.
inermis (*Allognosta*), 94.
Inermyia, 52.
inflata (Ruba), 49.
infurcata (*Pachygaster*), 21.
insignis (Syneches), 322.
instituta (*Anthrax*), 227.
instituta (Argyramœba), 227.
insularis (Chrysopilus), 140.
insulata (*Anthrax*), 203.
insulator (Exoprosopa), 203.
intermedia (*Atherix*), 116.
intermedia (Atrichops), 116.
intermedia (Argyramœba), 221.
invaria (Thereva), 302.
iridipennis (Parahybos), 343.
irrorata (Tachydromia), 370.
Isopenthes, 234.

javana (Atriadops), 155.
javana (*Beris*), 30.
javana (*Colax*), 155.
javana (Tinda), 30.
javana (Toxophora), 287.

kashmirensis (Odontomyia), 67.
kashmirensis (Pterodontia), 166.
kempi (Thereva), 298.

labiata (Atherix), 120.
læta (Hermetia), 40.
lanopyga (*Atherix*), 115.
lanopyga (Atrichops), 115.
lar (*Anthrax*), 194.
lar (*Bibio*), 194.
lar (Exoprosopa), 194.
Lasia, 163.
Lasiopa, 52.
lateralis (Exoprosopa), 198.
latifascipennis (Tachydromia), 375.
latipennis (Exoprosopa), 198.
latus (Chrysopilus), 143.
Lepidanthrax, 232.
LEPTIDÆ, 100.
LEPTINÆ, 112.
Leptis, 124, 128.
Leptomydas, 320.
Leptopeza, 362.
Leptosceles, 370.
limbata (*Atherix*), 115.
limbata (Atrichops), 115.
limbiventris (*Toxocera*), 42.
limitaris (Argyramœba), 220.
limpida (Anthrax), 255.
Litanomyia, 367.

Litorhynchus, 189.
lomata (Pialea), 160.
LOMATIINÆ, 255.
Lonchoptera, 388.
LONCHOPTERIDÆ, 387.
Lonchopteryx, 388.
longicornis (Brachystoma), 371.
longicornis (*Brevios*), 377.
longipennis (Ptecticus), 75.
longipennis (*Sargus*), 75.
longirostris (Anastœchus), 278.
longispinus (Ampsalis), 44.
lucens (*Anthrax*), 254.
lucida (Anthrax), 254.
luctuosus (Chrysopilus), 133.
luridus (*Sargus*), 77.
lusitanicus (Mydas), 320.
lutatius (Odontomyia), 70.
lutatius (*Stratiomys*), 70.
lutea (Lonchoptera), 389.

Macellopalpus, 122.
macilentus (Systropus), 289.
Macroceromys, 96.
Macrostomus, 345.
mactans (Sargus), 83.
maculipenne (*Ephippium*), 47.
maculipennis (Negritomyia), 47.
maculiventris (Exoprosopa), 200.
maculatus (Asilus), 287.
maculatus (Bombylius), 267.
magnifica (Ceylonia), 156.
magnificus (*Sargus*), 81.
magnipennis (Chrysopilus), 138.
major (Bombylius), 261, 265.
manifesta (Anthrax), 242.
marginata (Empis), 356.
marginata (Eudmeta), 42.
marginata (*Hermetia*), 42.
marginata (*Pachymeria*), 356.
marginata (Usia), 283.
marmoratus (Chrysopilus), 131.
maura (*Anthrax*), 238.
maura (Empis), 357.
Megapalpus, 284.
Mesophysa, 163.
metallinus (Sargus), 82.
metatarsalis (*Atherix*), 117.
metatarsalis (Atrichops), 117.
metatarsata (Elaphropeza), 386.
Metaponia, 93.
Microchrysa, 87,
Microdromia, 366.
Microdromya, 366.
micropilosa (Stratiomyia), 60.
minimus (Bombylius), 273.
minuta (Odontomyia), 65.
minutus (Syneches), 330.
modifera (*Tinda*), 30.
Monacanthomyia, 23.
morio (Anthrax), 234.
morio (Stomoxys), 178.
MYDAIDÆ, 314.
Mydas, 316.
Myiochrysa, 84.
Myochrysa, 84.
mystaceum (Spogostylum), 213.

Negritomyia, 47.
NEMESTRINIDÆ, 144.
Neopachygaster, 20.
nepalensis (Tachydromia), 377.
Nerna, 31.
nigella (Thereva), 299.
niger (Hybos), 340.
nigra (Clinocera), 364.
nigricaudus (*Systropus*), 291.
nigricornis (Rhachicerus), 105.
nigricornis (Xylomyia), 99.
nigripes (*Phycus*), 309.
Nigritomya, 47.
nigrofemorata (Argyramœba), 230.
nigrofemorata (*Pachygaster*), 25.
nigronitidus (Hybos), 342.
nitens (Hybos), 341.
nitidulus (Bombylius), 278.
nivalis (Systœchus), 277,
nivea (*Atriadops*), 156.
niveicauda (Argyramœba), 224.
niveisquamis (Argyramœba), 229.
niveiventris (Exoprosopa), 207.
nubila (Tachydromia), 378.

obesa (*Clitellaria*), 26.
obscura (Clinocera), 366.
obscura (Hirmoneura), 147.
obscura (*Platypeza*), 392.
obscurifrons (Argyramœba), 220.
ochracea (Hirmoneura), 151.
ochracea (*Odontomyia*), 65.
Octacantha, 90.
octomaculatus (Oncodes), 170.
OCYDROMIINÆ, 362.
Odontomyia, 61.
œnomaus (Hyperalonia), 185.
œstracea (Trichopsidea), 153.
Oncodes, 168.
opaca (Hirmoneura), 150.
opaca (Syndyas) 333.
opalescens (Chrysopilus), 134.
ophioneus (Systropus), 291.
Oplacantha, 90.
Opseogymnus, 61.
oratorio (Tachydromia), 366.
orientalis (Bombylius), 263.
orientalis (*Platypalpus*), 378.
orientalis (*Platypeza*), 392.
orientalis (Tachydromia), 378.
ornatipennis (Chrysopilus), 132.
Oxycera, 53.

Pachygaster, 20.
PACHYGASTRINÆ, 19.
Pachymeria, 347.
Pachymerina, 347.
palliditarsis (Syneches), 331.
palliditibiæ (*Platypalpus*), 379.
palliditibiæ (Tachypeza), 379.

pallipes (Acarterus), 335.
pallipes (*Sargus*), 82.
paniscus (Anthrax), 248.
paniscus (*Bibio*), 248.
PANOPINÆ, 160.
Parahybos, 343.
Paramesia, 364.
Paranthrax, 234.
Pararthropeas, 108.
Parasymmictus, 147.
Parisus, 261.
parvicellulata (Syndyas), 333.
Pelechoidocera, 120.
peleteria (Lasiopa), 52.
pennipes (*Anthrax*), 197.
pennipes (Empis), 347.
pennipes (Exoprosopa), 197.
pennipes (*Hyperalonia*), 197.
persequa (Thereva), 301.
peshawarensis (Hilara), 360.
Philopota, 158.
PHILOPOTINÆ, 158.
Phoroxypha, 374.
Phthiria, 284.
Phtyria, 284.
Phycus, 306.
Phyllodromia, 367.
Phyllophora, 29.
Pialea, 160.
Platypalpus, 374.
Platypeza, 391.
PLATYPEZIDÆ, 390.
Platyptera, 347.
Platypterygia, 347.
plebeja (Musca), 297.
Plecticus, 73.
Pœcilanthrax, 234.
Pœcilognathus, 284.
polita (Musca). 87.
polita (Zabrachia), 21.
propinquus (Bombylius), 272.
Prosopochrysa, 86.
Psellidotus, 61.
Psilocephala, 302.
Ptecticus, 73.
Pteredontia, 165.
Pterodontia, 165.
Pterospilus, 327.
Ptilocera, 33.
puerula (Exoprosopa), 205.
pulchellus (*Bombylius*), 264.
pulchellus (*Comastes*), 264.
pulcherrima (Odontomyia), 65.
pulicarius (Bombylius), 284.
pusilla (*Odontomyia*), 66.

quadridentata (Stratiomys), 33.

referens (Anthrax), 255.
resplendens (Dischistus), 273.
Rhachicerus, 104.
Rhagio, 124.
Rhamphomyia, 345.
Rhamphomyza, 345.
Rhyphomorpha, 104.
rostrata (Empis), 355.
rotundicornis (Drapetis), 383.
Ruba, 48.
rubrithorax (Odontomyia), 67.
ruficornis (Mydas), 317.
rufipes (Drapetis), 383.
rufithorax (*Empimorpha*), 359.
rufithorax (Hilara), 359.
rufoabdominalis (Odontomyia), 64.
rufomarginatus (Oncodes), 171.
rugicollis (*Anthrax*), 195.
rusticus (Syneches), 331.

sapphirina (Chloromyia), 84.
sapphirinus (*Sargus*), 84.
SARGINÆ, 72.
Sargus, 81.
SCENOPINIDÆ, 310.
Scenopinus, 311.
scintillans (*Bombylius*), 264.
scolopacea (Leptis), 124.
sedophila (Usia), 282.
segmentatus (Chrysopilus), 135.
semifuscata (Anthrax), 241.
semifuscata (Hyperalonia), 188.
semilucida (*Anthrax*), 212.
semilucida (Exoprosopa), 212.
septemnotata (Dolichocephala), 371.
sequa (Psilocephala), 305.
sequa (*Thereva*), 305.
Sicus, 374.
signata (Oxycera), 54.
signatus (Harpamerus), 334.
simplex (Syneches), 327.
singularis (*Hermetia*) 42.
sinuatus (*Bombylius*), 265.
smaragdina (*Ptilocera*), 34.
socius (*Bombylius*), 276.
socius (Systœchus), 276.
solennis (Odontomyia), 69.
Solva, 96.
sordidus (Chrysopilus), 143.
sphinx (*Anthrax*), 187.
sphinx (*Bibio*), 187.
sphinx (Hyperalonia), 187.
spinigerum (*Ephippium*), 46.
spinithorax (*Rhaphiocera*), 46.
splendens (Lasia), 163.
Spogostylum, 213, 214.
Spongostylum, 213.
squamata (Empis), 352.
stigma (Chrysopilus), 142.
Stonyx, 234.
Stratiomyia, 58.
STRATIOMYIDÆ, 17.
STRATIOMYINÆ, 56.
Stratiomys, 58.
Stratiosphecomyia, 36.
Stratiotomyia, 58.
stylata (Exoprosopa), 201.
Styrex, 128.
subcilipes (Empis), 354.
submutica (*Odontomyia*), 66.
Subula, 96.
Subulaomyia, 96.
suffusipennis (Hyperalonia) 188.
sulcata (Empis), 345.
sulphureus (Bombylius), 275.
Suragina, 121.
Sylvicola, 124.
Syndyas, 333.
Syneches, 327.
Systœchus, 275.
Systrophopus, 289.
Systrophus, 289.
SYSTROPINÆ, 289.
Systropus, 289.

Tachydromia, 374.
TACHYDROMIINÆ, 373.

Tachypeza, 378.
tantalus (*Anthrax*), 181.
tantalus (*Exoprosopa*), 181.
tantalus (Hyperalonia), 181.
tenebrica (*Clitellaria*), 46.
tenuipes (Hybos), 338.
terminalis (Bombylius), 270.
testaceus (Sargus), 73.
Thamnodromia, 367.
Thereva, 297.
THEREVIDÆ, 295.
thereviformis (Desmomyia), 107.
thereviformis (Pararthropeas), 109.
Thorasena, 39.
Thyridanthrax, 234.
tibialis (*Beris*), 93.
tibialis (Chorisops), 93.
Tinda, 29.
Toxocera, 41.
Toxophora, 287.
TOXOPHORINÆ, 286.
transversa (Lepidanthrax), 233.
transversa (Odontomyia), 71.
triangulata (Leptis), 127.
Trichopeza, 371.
Trichopsidea, 153.
trizolor (*Bombylius*), 263.
Trinaria, 189.
Triodites, 256.
tripunctata (Anthrax), 214, 218.
tristis (*Exoprosopa*), 180.
tristis (Hyperalonia), 180.
troglodyta (Anthrax), 254.
troglodyta (*Bibio*), 254.

unicinctus (Rhachicerus), 106.
unicolor (Acarterus), 334.
unicolor (Chrysopilus), 141.
unicolor (Leptis), 126.
unifasciata (Rhamphomyia), 345.
Usia, 281.

vagans (Allognosta), 94.
vagans (*Metoponia*), 94.
Vappo, 20.
variegata (Drapetis), 381.
variegata (Elaphropeza), 387.
variegata (Stratiospheco-myia), 37.
variegatus (*Bombylius*), 265.
Velocia, 178.
ventralis (Brachycara), 85.
Vertexistemma, 163.
Verticistemma, 163.
vicinus (Bombylius), 270.
Villa, 234.
villosa (*Nemotelus*), 53.
villosa *var.* himalayensis (Lasiopa), 53.
viridænea (Philopota), 159.
viridana (Odontomyia), 72.
vitrea (Exoprosopa), 210.
vitripennis (*Chrysochlora*), 86.
vitripennis (Exoprosopa), 209.
vitripennis (Leptopeza), 363.
vitripennis (Prosopochrysa), 86.
Volucella, 281.

Wallacea, 24.
wulpii (Bombylius), 264.
wulpii (Ptecticus), 77.

Xylomya, 96.
Xylomyia, 96.
XYLOMYINÆ, 96.
XYLOPHAGINÆ, 104.
Xystropus, 289.

yerburyi (Chrysopilus), 139.

Zabrachia, 21.

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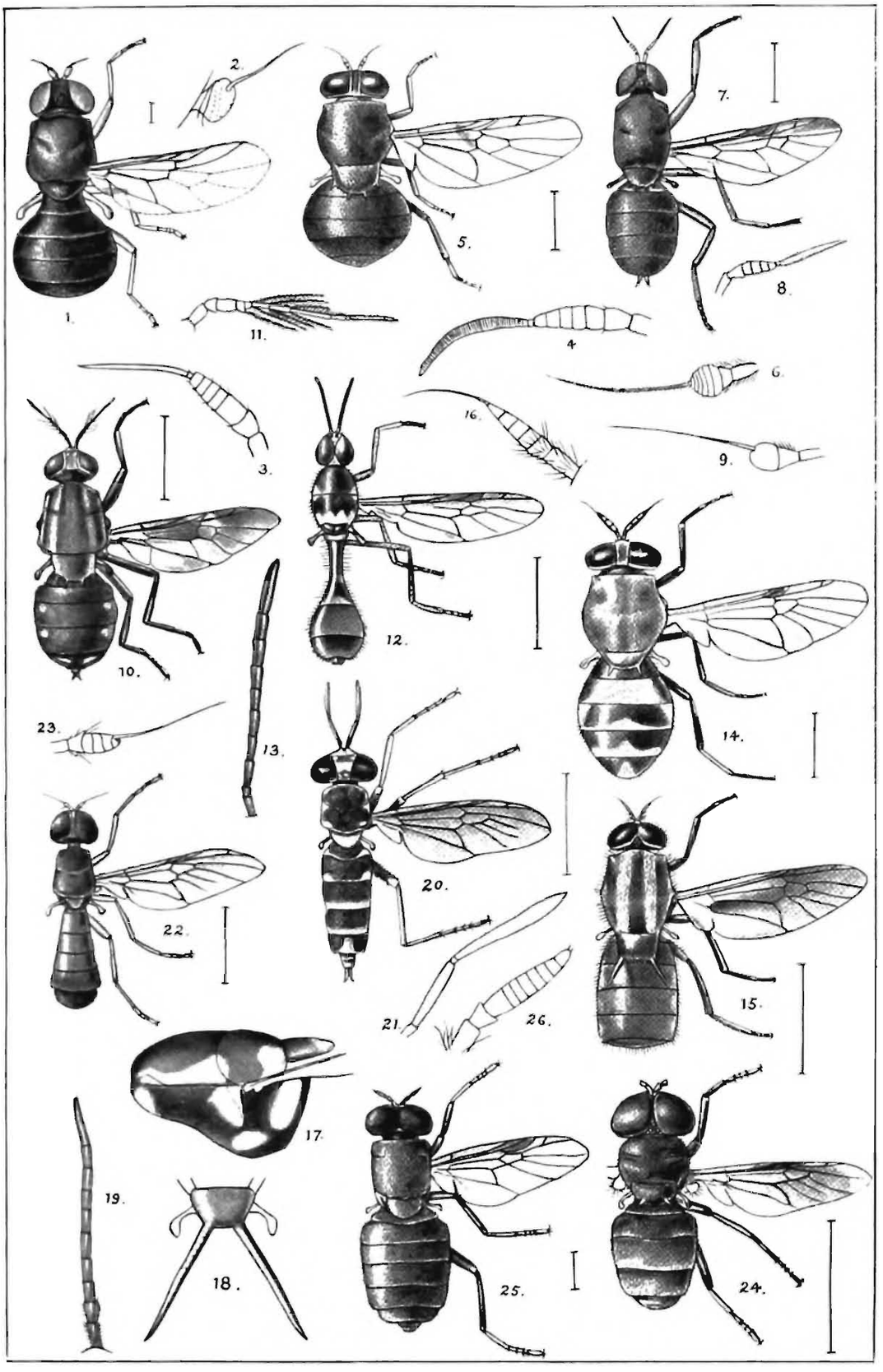
EXPLANATION OF PLATE I.

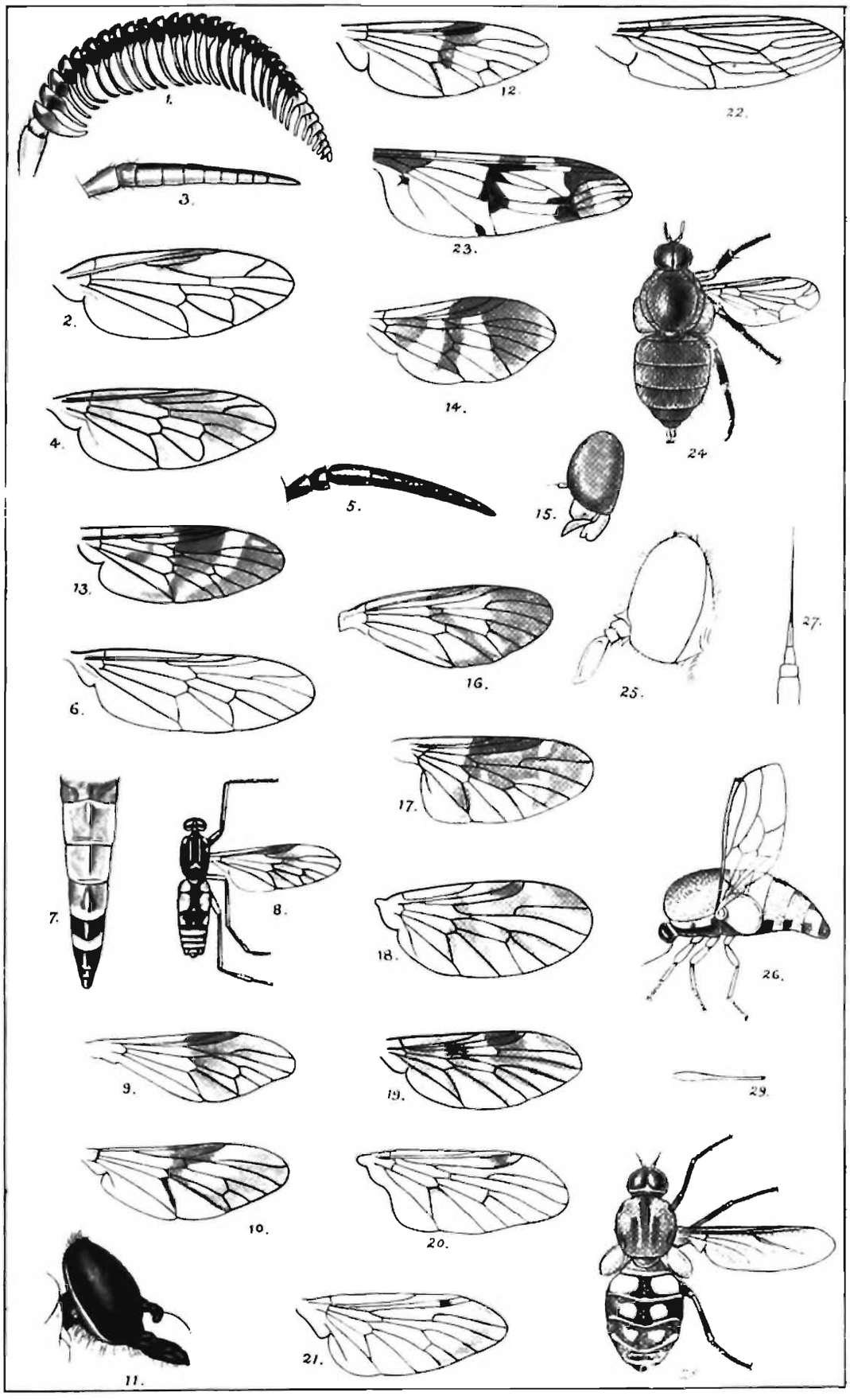
Fig. 1. *Zabrachia albipes*, Brun., ♀ ; p. 21.
2. „ „ antenna.
3. *Wallacea argentea*, Dol., antenna; p. 25.
4. *Acanthina argentihirta*, Brun., antenna; p. 28.
5. *Craspedometopon frontale*, Kert.; p. 29.
6. „ „ antenna.
7. *Tinda javana*, Macq., ♀ ; p. 30.
8. „ „ antenna.
9. *Evasa bipars*, Walk., antenna; p. 32.
10. *Ptilocera fastuosa*, Gerst., ♀ ; p. 34.
11. „ „ antenna.
12. *Stratiosphecomyia variegata*, Brun., ♂ ; p. 37.
13. „ „ antenna.
14. *Clitellaria heminopla*, Wied., ♀ ; p. 50.
15. *Ephippium bilineatum*, F., ♂ ; p. 46.
16. „ „ antenna.
17. *Eudmeta marginata*, F., side of thorax; p. 42.
18. *Ampsalis longispinus*, Brun., scutellum; p. 44.
19. „ „ antenna.
20. *Hermetia læta*, Meij., ♀ ; p. 40.
21. „ „ antenna.
22. *Sargus metallinus*, F., ♂ ; p. 82.
23. „ „ antenna.
24. *Odontomyia rufoabdominalis*, Brun., ♂ ; p. 64.
25. *Allognosta vagans*, Lw., ♂ ; p. 94.
26. „ „ antenna.



INDIAN STRATIOMYIDÆ.

EXPLANATION OF PLATE II.

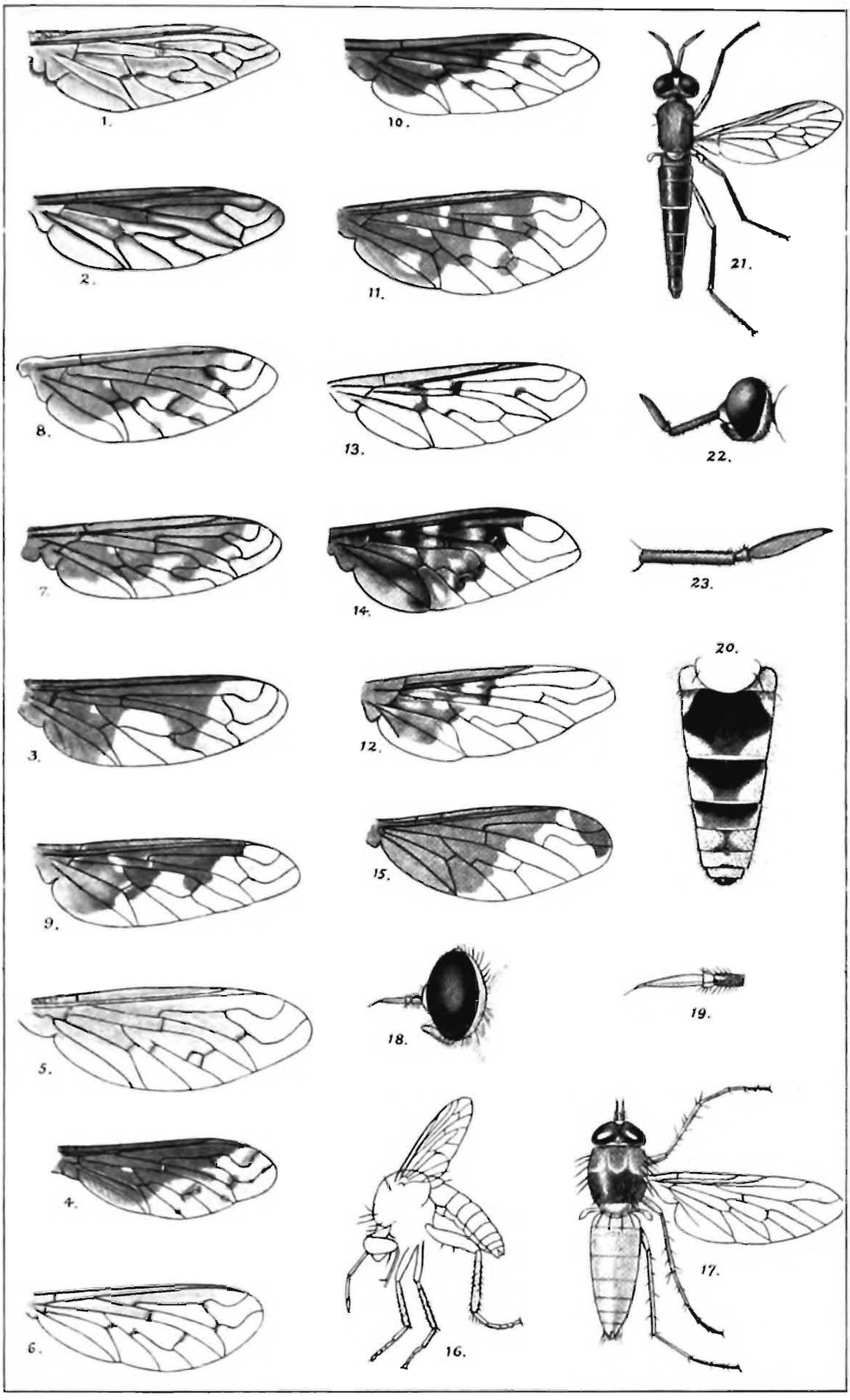
Fig. 1. *Rhachicerus nigricornis*, Brun., antenna; p. 105.
2. „ *unicinctus*, Brun., wing; p. 106.
3. *Cœnomyioides edwardsi*, Brun., antenna; p. 111.
4. „ „ wing.
5. *Pararthropeas thereviformis*, Brun., antenna; p. 109.
6. „ „ wing.
7 *Atrichops calopa*, Brun., ♂, abdomen; p. 114.
8. „ *lanopyga*, Brun., ♂; p. 115.
9. „ *cincta*, Brun., wing; p. 118.
10. „ ? *limbata*, O.-S., wing; p. 115.
11. „ *intermedia*, Brun., lateral view of head;
12. „ „ wing. [p. 116.
13. „ *cœrulescens*, Brun., wing; p. 119.
14. „ *metatarsalis*, Brun., wing; p. 117.
15. *Macellopalpus fulvidus*, Brun., lateral view of head; [p. 122.
16. *Leptis apicipennis*, Brun., wing; p. 125.
17. *Chrysopilus marmoratus*, Brun., wing; p. 131.
18. „ *albopictus*, Brun., wing; p. 131.
19. „ *ornatipennis*, Brun., wing; p. 132.
20. „ *unicolor*, Brun., wing; p. 141.
21. „ *stigma*, Brun., wing; p. 142.
22. *Hirmoneura opaca*, Licht., wing; p. 150.
23. *Ceylonia magnifica*, Licht., wing; p. 156.
24. *Pialea auripila*, Brun., ♂; p. 161.
25. „ „ lateral view of head.
26. *Pterodontia dorsolineata*, Brun., ♀; p. 167.
27. „ „ antenna.
28. *Oncodes octomaculatus*, Brun., ♂; p. 170.
29. „ „ arista.



INDIAN LEPTIDÆ, NEMESTRINIDÆ AND CYRTIDÆ.

EXPLANATION OF PLATE III.

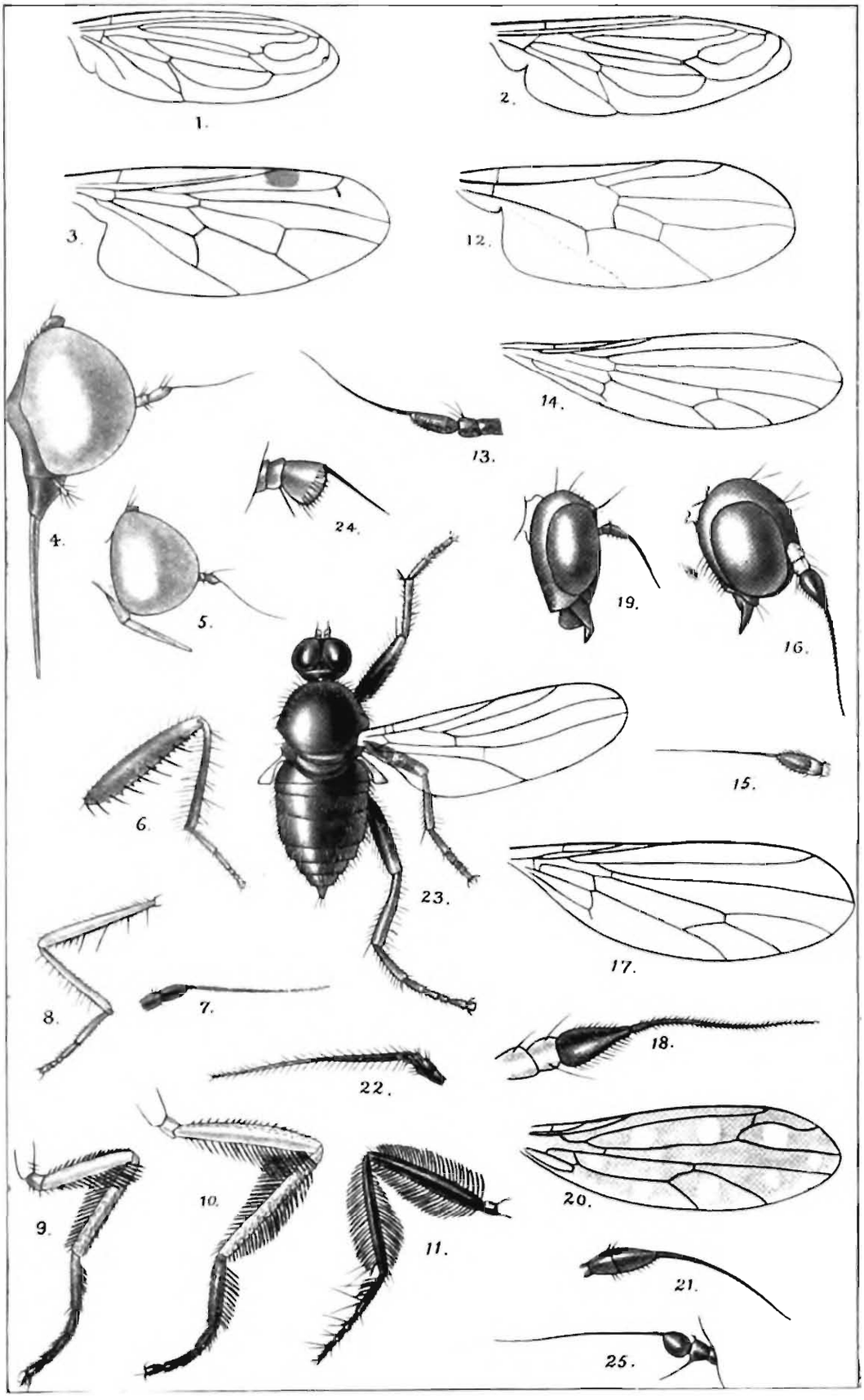
Fig. 1. *Hyperalonia suffusipennis*, Brun., wing; p. 188.
2. „ *semifuscata*, Brun., wing; p. 188.
3. *Exoprosopa lar*, F., wing; p. 194.
4. „ *insulata*, Walk., wing; p. 203.
5. „ *bengalensis*, Macq., wing; p. 206.
6. „ *brahma*, Sch., wing; p. 206.
7. „ *lateralis*, Brun., wing; p. 198.
8. „ *annandalei*, Brun., wing; p. 199.
9. „ *puerula*, Brun., wing; p. 205.
10. *Argyramœba distigma*, Wied., wing; p. 218.
11. „ *obscurifrons*, Brun., wing; p. 220.
12. „ *gestroi*, Brun., wing; p. 222.
13. „ *duvaucelii*, Macq., wing; p. 225.
14. „ *argentiapicalis*, Brun., wing; p. 227
15. „ *gentilis*, Brun., wing; p. 230.
16. *Toxophora javana*, Wied.; p. 287.
17. *Psilocephala sequa*, Walk., ♂; p. 305.
18. „ „ head in profile.
19. „ „ antenna.
20. „ „ abdomen, ♀
21. *Phycus brunneus*, Wied.; p. 307.
22. „ „ head in profile.
23. „ „ antenna.



INDIAN BOMBYLIIDÆ AND THEREVIDÆ.

EXPLANATION OF PLATE IV.

Fig. 1. *Leptomydas indianus*, Big., wing; p. 320.
2. *Mydas annulata*, Brun., wing; p. 319.
3. *Syneches bigoti*, Bezzi, wing; p. 329.
4. „ *palliditarsis*, Brun., head in profile; p. 331.
5. *Acarterus fuscipennis*, Brun., head in profile; p. 335.
6. *Hybos gagatinus*, Big., hind leg; p. 339.
7. „ *tenuipes*, Brun., antenna; p. 338.
8. „ „ hind leg.
9. *Empis rostrata*, Brun., middle leg; p. 355.
10. „ „ hind leg.
11. „ *squamata*, Brun., ♀, hind leg; p. 352.
12. *Leptopeza vitripennis*, Brun., wing; p. 363.
13. „ „ antenna.
14. *Phyllodromia flavida*, Brun., wing; p. 368.
15. „ „ antenna.
16. „ *indica*, Brun., head in profile; p. 369.
17. „ „ wing.
18. „ „ antenna.
19. *Dolichocephala 7-notata*, Brun., head in profile; p. 371.
20. „ „ wing.
21. „ „ antenna.
22. *Tachydromia nepalensis*, Brun., antenna; p. 377.
23. *Drapetis brevior*, Brun., ♂; p. 382.
24. „ „ antenna.
25. „ *rotundicornis*, Brun., antenna; p. 383.



INDIAN MYDAIDÆ AND EMPIDÆ.